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Province of
British Columbia
Ministry of Industry
and Small Business
Development

lower mainland industrial land strategy

Greater Vancouver Regional District
Central Fraser Valley Regional District
Dewdney-Alouette Regional District
Regional District of Fraser-Cheam

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Underwood McLellan Ltd.

march, 1984

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EXECUTIVE SUMMARY

1. This report represents the final phase of the Lower Mainland Industrial Project which was designed to determine the adequacy of industrial land supply in the lower mainland. The first phase consisted of an industrial land supply inventory for all four regional districts in the lower mainland, the second phase projected demand for land to the year 2001, with this phase evaluating the balance between supply and demand and recommending actions leading to a coordinated lower mainland industrial land strategy.

2. Initial findings suggested a reasonable supply of industrial land throughout the study area, but concern was expressed about the inclusion in suppy data of large areas with apparent goetechnical constraints. To review this, and to arrive at a coordinated strategy for industrial land planning in the lower mainland, the Ministry of Industry and Small Business Development contracted the firm of Underwood McLellan Ltd. to conduct the necessary work.

3. To assist in the definition of a suitable industrial land strategy, a number of issues, trends, and supply constraints were reviewed. Interviews were carried out to arrive at public and private sector perceptions with regard to land supply and development trends. The report summarizes the findings.

4. Since geotechnical constraints were perceived as a critical factor affecting the real supply of industrial land, this topic received considerable emphasis. The firm of Golder Associates was retained as a sub-consultant to review geotechnical constraints. Economic issues and policy concerns were also assessed by economist Gary Bowden of Quadra Economic Consultants. The findings of the project team led to the preparation of refined supply data, and recommendations for an industrial land strategy.

5. Demand projections for industrial land must take into account infrastructure requirements and replacement of land lost to other uses. This has been expressed as a gross-up factor on demand. A gross-up factor of 1.5 over net demand was applied.

6. A number of trends are identified which are reflected in demand projections, and in the type of land required. These include:

   a) structural changes in the economy.
   b) the growth of intermodal operations.
   c) the trend towards increased development densities.
   d) shifting emphasis towards quasi-industrial development such as warehouse stores.

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These trends are manifested in:

- an increasing proportion of industrial demand favouring wholesale and service sector activities as opposed to manufacturing.

- large multimodal distribution centres, with less emphasis on individual rail sidings.

- maximization of development and productivity on existing sites.

- possible use of multi-storey buildings to accommodate specialized industrial activities.

7. In evaluating several issues and trends, the report notes:

- the value of a continued process of industrial land planning and coordination in the lower mainland.

- a necessity to remove narrowly defined zoning regulations which are poorly attuned to changing market forces and trends.

- greater emphasis on short term rather than long term land banking.

- a trend towards greater intensification of industrial land development resulting from high land prices and holding costs.

8. Geotechnical and floodplain factors were evaluated for selected industrial areas to establish whether they should be included in supply calculations. The assessment examined site stability, seismic stability, flood susceptibility, foundation conditions, ground water conditions and outlined treatment required for adverse site conditions. All of the sites reviewed were then evaluated as to their suitability for a range of industrial activities defined by tolerance to ground settlement. Several floodprone sites were reviewed in relation to the order of magnitude of required remedial action. It is concluded that:

- all of the sites have at least some potential for industrial development, with the range of possible development governed by the degree of remedial action undertaken.

- the most difficult to develop sites are South Richmond, Queensborough/Tree Island, South Westminster/Port Mann, Port Coquitlam and Village West (Chilliwack).

- the relative suitability rating of sites may suggest specific development strategies for these areas.

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9. The balance between industrial land supply and demand was calculated by including a 1.5 gross-up factor on net demand, and by adding a further 50% margin on the resultant figures to ensure the availability of a reasonable market surplus. Results by year 2001 are indicated below.

Location	Ind. Land Supply	Ind. Land Demand (+50% Surplus)	Surplus/ Deficiency
Greater Vancouver R.D.	4378.4 ha	3704.1 ha	674 ha
Central Fraser Valley R.D.	1063.3 ha	1296.5 ha	-233 ha
Dewdney-Alouette R.D.	549.2 ha	363.9 ha	185 ha
Fraser-Cheam R.D.	479.3 ha	270.8 ha	209 ha
LOWER MAINLAND	6470.2 ha	5635.3 ha	835 ha

Supply figures are comprised of both vacant industrial land, and industrial designated land used for non-industrial purposes.

It is concluded that by 2001 -

- an adequate supply of industrial land will be available in the Greater Vancouver Regional District and Fraser Cheam Regional District.
- a shortage of supply will exist at Central Fraser Valley Regional District.
- a surplus will be available at Dewdney-Alouette, but supply excludes 410 hectares designated for aggregate resource use. If this area is included, the long term surplus is increased.

10. Strategy proposals are categorized under four headings: planning framework, information and data base, zoning and land use regulations, and servicing policy. For each component, an objective is identified, action plans are stated, and the impact is evaluated.

11. To ensure adequate knowledge of industrial land development trends and to achieve desirable changes in land use policies several activities are proposed:

a) regular information collection and dissemination with respect to:

- industrial land absorption rates
- land use conversion process
- industrial land use
- industrial building occupancy (vacancy rates)
- industrial zoning changes
- building sizes

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b) the identification and designation, for long range purposes, of about 250 hectares of additional land in Central Fraser Valley region to accommodate future industrial demand.

c) a review of zoning bylaws intended to lead to the provision of a broad and reasonable range of activities to be defined generically rather than through narrowly classified groupings which can frequently result in the need for additional zones.

d) the careful attention in zoning bylaws and maps to interim uses in areas designated for long term industrial development, in order to facilitate the land conversion process.

e) that federal/provincial financial assistance be supplied for the installation of servicing infrastructure in areas with proven demand and with limited financial resources.

f) it is proposed that all serviced industrial areas be prezoned and that, where practical, development cost charges be imposed at the building permit stage rather than upon zoning or subdivision approval to reduce front end cost to the developer.

12. Lower mainland wide cooperative industrial land planning, including the identification and protection of suitable industrial sites is deemed of paramount importance. Two possible options are suggested:

a) the establishment of an industrial land committee comprising staff of the four regions to be assigned the responsibility of coordinating industrial land planning activities, data collection and dissemination. It is expected that some data collection, mapping, etc., would be completed at the municipal level.

Or alternatively,

b) provide a person at the provincial level, through the Ministry of Industry and Small Business Development, charged with the responsibility of coordinating industrial land activities. Data collection, maintenance, and analysis would however continue to be carried out at the municipal and regional district level.

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1.0 INTRODUCTION

1.1 Study Purpose

This report is the culmination of a Lower Mainland wide industrial project undertaken jointly by the four regional districts, Greater Vancouver, Dewdney-Alouette, Central Fraser Valley, Fraser-Cheam, and by the Ministry of Industry and Small Business Development. Respective regional district boundaries are illustrated on Figures 1, 2, and 3. The industrial project was designed to analyse the supply and demand for industrial land, leading to the development of a coordinated policy framework to ensure a continued adequate supply of land for industry.

In the first phase, each regional district examined industrial land use and supply in relation to land zoned for industrial purposes or so designated by Official Plans. Demand forecasts were derived from provincial economic forecasts and interviews, and projected by industrial sector and regional district area. The forecast constituting the second phase of the project was prepared by Currie, Coopers and Lybrand*.

To complete the development of the third phase, a coordinated industrial land strategy, the Ministry of Industry and Small Buisness Development (MISBD) retained the firm of Underwood McLellan Ltd.

This report is based on data and information previously collected, an analysis of the balance between supply and demand, and an evaluation of other issues deemed relevant to the establishment of a suitable policy framework. To arrive at an appropriate strategy, this report first discusses planning

*"The Demand for Industrial Land In The Lower Mainland - Volume 1 - Main Report", Currie, Coopers & Lybrand Ltd., January, 1983.

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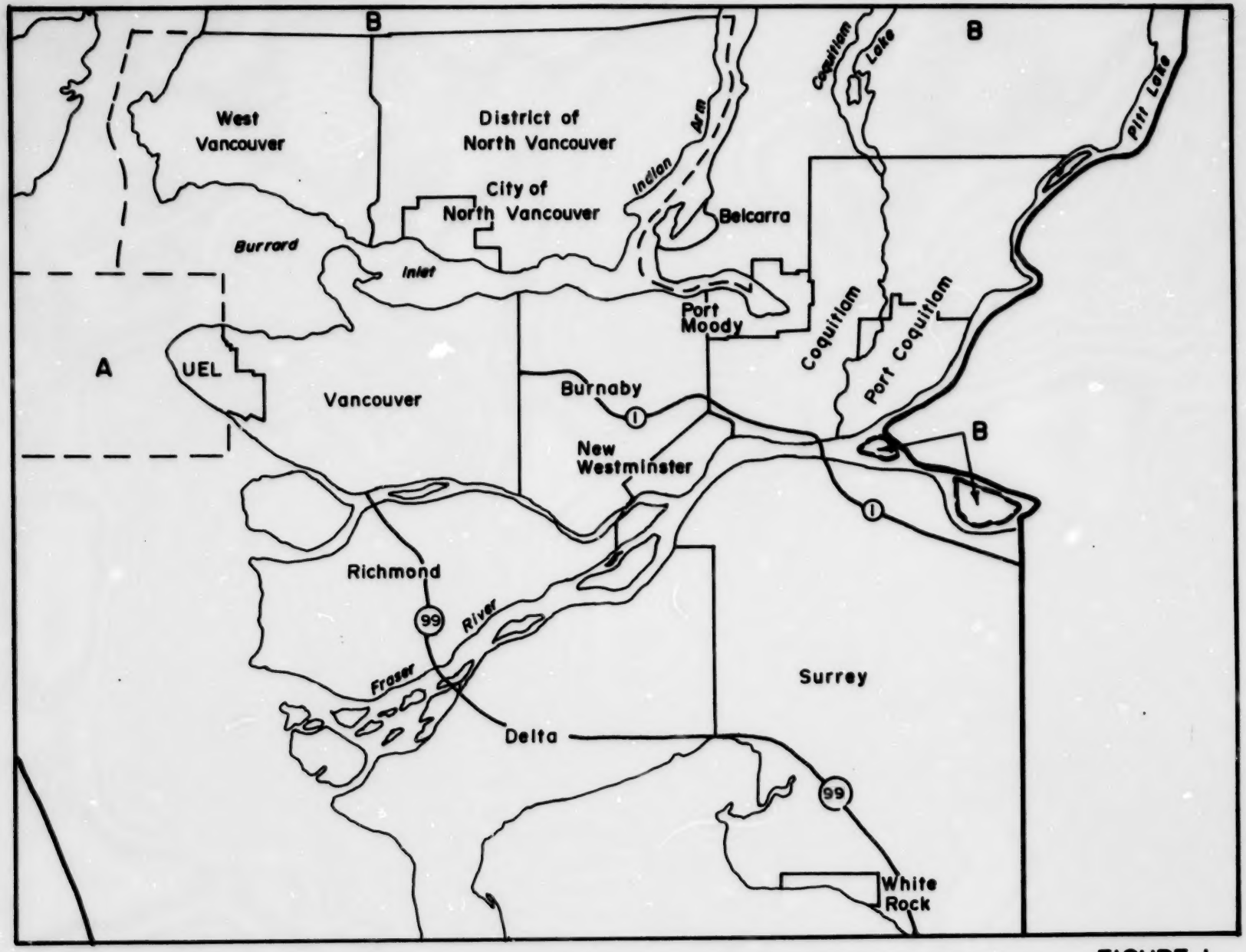

FIGURE I

GREATER VANCOUVER REGIONAL DISTRICT

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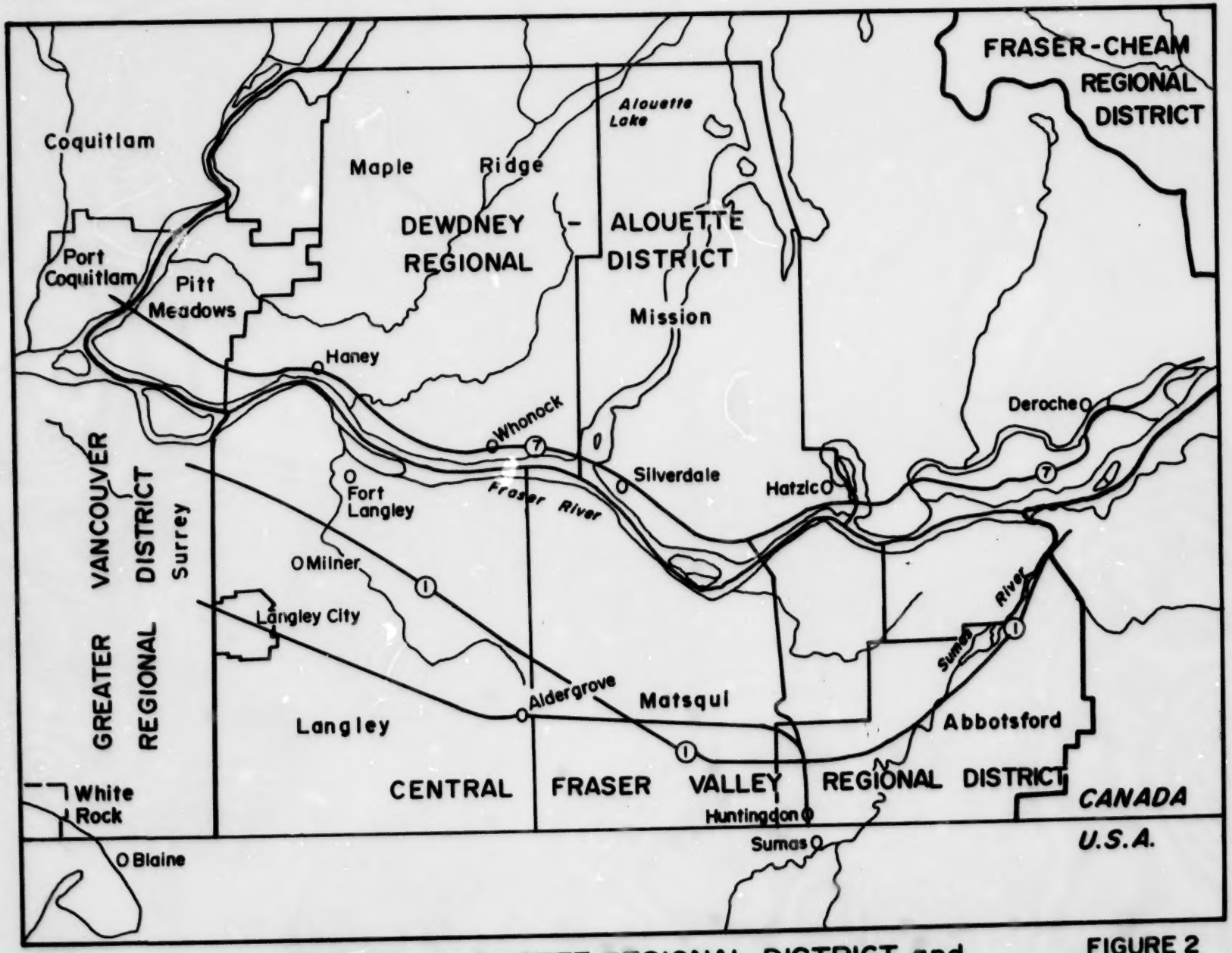

FIGURE 2

DEWDNEY-ALOUETTE REGIONAL DISTRICT and
CENTRAL FRASER VALLEY REGIONAL DISTRICT

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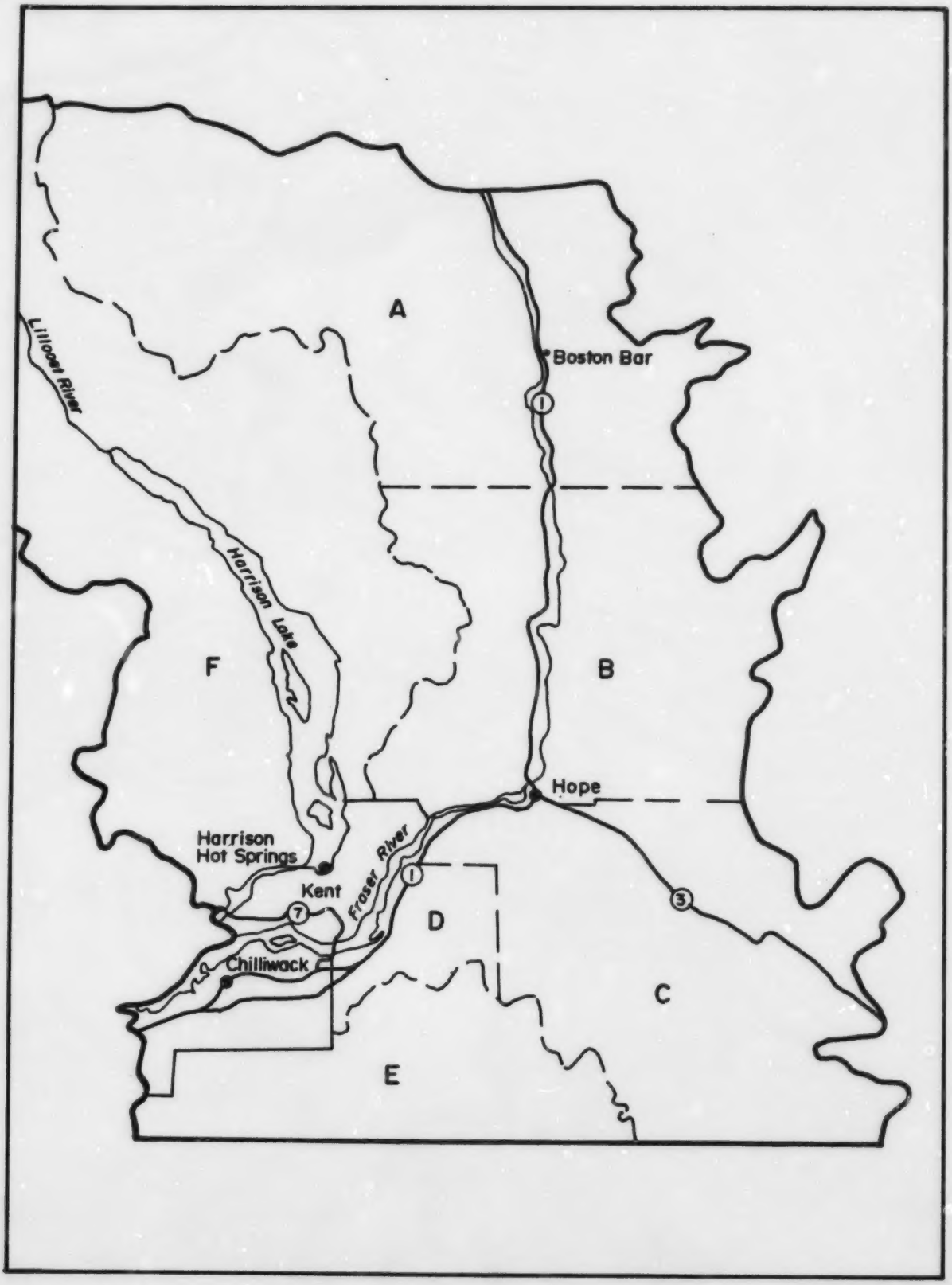

FIGURE 3

FRASER-CHEAM REGIONAL DISTRICT

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issues affecting the supply of industrial land, then reviews recent development trends, and finally assesses the impact of geotechnical constraints on the supply of land. Supply and demand data is reviewed and modified as necessary to result in best estimates of the balance between supply and demand. The final section of the report consists of a strategy for industrial land planning comprised of objectives, action plans and impact analysis.

1.2 Methodology

The methodology used to arrive at factors to be considered in the strategy consisted of a data review, geotechnical evaluation, and private and public sector interviews.

Data utilized to arrive at the land strategy was largely obtained directly from the demand study, with supply figures made available by each of the four regional districts. Budget and time constraints did not permit the collection of new data or detailed site evaluations.

At the initial stage of this phase it was emphasized that a significant concern about the validity of supply data arose from the impact of geotechnical factors on land developability. Questions were raised about the appropriateness of including these areas as part of the industrial land supply. In a review of industrially designated lands by subconsultant Golder Associates, eighteen sites were examined in relation to natural hazards, geotechnical conditions and remedial actions required to permit development. Results are summarized in matrix form in the text.

The project team also examined land use trends and issues which could be of significance in arriving at a strategy. Two major sources were contacted to assist in defining trends and issues. One, public sector representatives, included most of the

principal municipalities in the Lower Mainland, and the second, private sector representatives, included representative industrial development firms active in the Lower Mainland, and realtors specializing in industrial land sales. In addition, discussions were held with planning staff at all four regional districts, and staff representatives of several Crown Corporations. A complete list of agencies and individuals contacted is included in the Appendix. Material pertaining to economic issues and policy questions was also reviewed by economist Gary Bowden of Quadra Economic Consultants.

The interview process revealed that a number of issues were of common concern and of importance in the industrial land planning process. These are reviewed in the text and dealt with as appropriate in the strategy section.

2.0 REVIEW OF SUPPLY AND DEMAND

2.1 Industrial Land Supply

Each of the four Lower Mainland regional districts has provided data on the supply of industrial land within its region. Supply data was based on areas designated or zoned as Industrial in the respective regional districts. Designations pertained primarily to those found in Official Regional Plans (O.R.P.). Since the project commenced, provincial legislation has rescinded the authority of regional districts to adopt and enforce regional plans. These plans however, represented a local government concensus on the location and future development of industrial land, and comprised an important foundation for this project.

The Greater Vancouver Regional District (G.V.R.D.) already had a well established data base and has historically collected data which varies somewhat from subsequent work undertaken by the other three regions.* Table II-1 summarizes the land supply for the entire Lower Mainland. Table II-2 provides additional information by detailing the use composition of industrial areas.

All four regions calculated the supply of industrial land in actual use plus vacant industrial areas. Vacant industrial land is comprised of land zoned or designated as industrial but vacant at the time the survey was undertaken.

*For example, the total area zoned Industrial, and/or so designated in the Official Regional Plan is available for all regions. However, the G.V.R.D. does not include data of industrially zoned areas situated outside areas designated Industrial in its regional plan.

TABLE II-1

INDUSTRIAL LAND SUPPLY SUMMARY

Area	Hectares	%
Greater Vancouver Regional District	4,378.4	67.7
Central Fraser Valley Regional District	1,063.3	16.4
Dewdney-Alouette Regional District	549.2	8.5
Fraser-Cheam Regional District	479.3	7.4
Lower Mainland Total	6,470.2	100.0

Note: Supply is composed of lands which are vacant or used for non-industrial purposes in industrial designated and/or zoned areas.

TABLE II-2

TOTAL INDUSTRIAL LAND SUPPLY (in hectares)

	TOTAL IND. AREA	ORP IND. AREA	INDUSTRIAL USE	TRANSP., COMM. AND UTILITIES	STORAGE	OTHER AND EXTRACTIVE	VACANT	NON-INDUSTRIAL
GVRD	(3) 8,335.2	8,335.2	(1) 4,620.9	(2) 5,025.6	(3) 727.7	(3) 73.3	(3) 2,635.0	(3) 1,743.4
CFVRD	2,726.2	1,226.1	365.0	667.6	94.9	535.4	540.9	522.4
DARD	1,494.0	1,123.2	147.4	221.7	8.4	157.3	(4) 317.3	231.9
FCRD	1,183.9	310.7	160.5	232.6	186.6	124.9	218.4	260.9
TOTAL LOWER MAINLAND	13,739.3	10,995.2	5,293.8	6,147.5	1,017.6	890.9	4,121.6	2,758.6

(1) Total industrially used land within and outside Official Regional Plan areas (within ORP = 2,088.7 hectares; outside ORP = 2,532.2 hectares).

(2) Total area in trans., comm. and utilities within and outside ORP areas (with ORP = 1,067.2 hectares; outside ORP = 3,958.4 hectares).

(3) Within Industrially designated ORP areas only. Remaining RD Total Area Figures represent total ind. area (within and outside ORP and airports).

(4) Excludes 410 hectares designated for aggregate resource extraction. The total industrial area also includes 218 hectares for Pitt Meadows airport.

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2.2 Industrial Land Demand

A forecast of demand for industrial land was prepared by Currie, Coopers & Lybrand. It analysed the determinants of industrial land demand in the Lower Mainland by regional district area to the year 2001. Their study did not attempt to quantify "gross-up" requirements, that is, additional land needed for infrastructure such as roads, services, and replacement need. This subject is dealt with in more detail in Section 2.3 of this report. Table II-3 provides details on their estimated net land demand for each regional district, as well as the principal sectoral components.

TABLE II-3

TOTAL INDUSTRIAL LAND REQUIREMENTS (in hectares)

REGIONAL DISTRICT	1981	1986	1991	1996	2001
GVRD					
Total Manufacturing	2,917.1	2,964.8	3,163.9	3,644.7	3,791.6
Wholesale Trade	1,012.6	1,046.6	1,154.2	1,339.2	1,540.3
Major Transportation	3,728.9	3,766.1	3,803.8	3,841.8	3,880.3
Other Transportation	759.2	797.3	836.9	879.0	922.7
Utilities	1,256.2	1,268.7	1,281.3	1,294.2	1,307.2
Total	9,673.9	9,843.5	10,240.5	10,998.9	11,442.1
CFVRD					
Total Manufacturing	231.9	309.6	395.8	535.4	631.3
Wholesale Trade	102.8	125.1	151.0	190.2	235.9
Major Transportation	623.6	629.7	636.2	642.7	649.1
Other Transportation	127.1	133.6	140.0	146.9	154.6
Utilities	11.3	13.8	16.2	19.8	23.5
Total	1,096.7	1,211.7	1,339.2	1,535.0	1,694.5
DARD					
Total Manufacturing	139.2	165.5	198.7	255.8	293.4
Wholesale Trade	5.7	6.1	7.3	8.9	11.3
Major Transportation	0.0	0.0	0.0	0.0	0.0
Other Transportation	9.3	9.7	10.1	10.9	11.3
Utilities	0.8	0.8	1.2	1.2	1.6
Total	155.0	182.5	217.7	277.2	317.7
FCRD					
Total Manufacturing	171.6	182.1	195.9	225.0	240.0
Wholesale Trade	14.6	15.8	18.6	23.5	28.7
Major Transportation	195.9	197.9	199.9	201.9	204.0
Other Transportation	154.2	161.9	170.0	178.5	187.4
Utilities	14.2	17.0	20.2	24.3	29.5
Total	550.4	574.7	604.6	653.2	689.6
LOWER MAINLAND					
Total Manufacturing	3,459.8	3,622.0	3,954.3	4,660.9	4,956.3
Wholesale Trade	1,135.7	1,193.6	1,331.1	1,561.8	1,816.2
Major Transportation	4,548.4	4,593.7	4,639.9	4,686.4	4,733.4
Other Transportation	1,049.8	1,105.7	1,157.0	1,215.3	1,276.0
Utilities	1,282.5	1,300.3	1,318.9	1,339.5	1,361.8
Total	11,476.1	11,812.8	12,402.0	13,464.8	14,144.3

Source: Currie, Coopers & Lybrand. Demand for Industrial Land in the Lower Mainland. Volume 1. January 31, 1983. Table 20.

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Table II-4 indicates the anticipated five year incremental industrial land demand for each regional district. It also includes data on recent (1981 figures) industrial land use comprising each sectoral component.

In the demand study it is noted that the demand figures may be overstated as trends towards increased density are probably underestimated. Thus, if industry makes more efficient use of land, it will result in a reduced demand for land. Demand forecasts were based on a model of growth forecasts prepared by the Central Statistics Bureau of the Ministry of Industry and Small Business Development. Increased growth rates are postulated in the early 1990's reflecting assumptions about low inflation, changes in technology and productivity.

2.3 Calculation of Gross-up Factor

Demand projections for industrial land did not take into account an allowance for infrastructure requirements such as road right-of-way, rail lines, transmission lines, utility easements, special setbacks, etc. Replacement need, created by the relocation of industry represents another factor. To ensure that demand figures include these "gross-up" needs, a multiplier has to be applied to demand forecasts. Each of the regional districts has, in the past, independently developed gross-up factors to accommodate infrastructure and replacement requirements. A variation of methodology exists to reflect local perceptions.

For example, the G.V.R.D. has a "gross-up" factor of about 1.95 to allow for replacement of lost industrial land, infrastructure, plus an additional allowance for new infrastructure on replacement lands. Fraser-Cheam uses a factor of about 1.55 allowing for replacement and infrastructure requirements. Dewdney-Alouette has an overall factor of 1.6 times net to arrive at gross figures.

TABLE II-4

NET NEW INDUSTRIAL LAND REQUIREMENTS (in hectares)*

REGIONAL DISTRICT	1981 inventory	1981-1986	1986-1991	1991-1996	1996-2001
GVRD					
Total Manufacturing	2,917.1	47.7	199.1	480.8	146.9
Wholesale Trade	1,012.6	34.0	107.6	185.0	201.1
Major Transportation	3,728.9	37.2	37.7	38.0	38.5
Other Transportation	759.2	38.1	39.6	42.1	43.7
Utilities	1,256.2	12.5	12.6	12.9	13.0
Total	9,673.9	169.5	396.6	758.8	443.2
CFVRD					
Total Manufacturing	231.9	77.7	86.2	139.6	95.9
Wholesale Trade	102.8	22.3	25.9	39.2	45.7
Major Transportation	623.6	6.1	6.5	6.5	6.4
Other Transportation	127.1	6.5	6.4	6.9	7.7
Utilities	11.3	2.5	2.4	3.6	3.7
Total	1,096.7	115.1	127.4	195.8	159.4
DARD					
Total Manufacturing	139.2	26.3	33.2	57.1	37.6
Wholesale Trade	5.7	0.4	1.2	1.6	2.4
Major Transportation	0.0	0.0	0.0	0.0	0.0
Other Transportation	9.3	0.4	0.5	0.7	0.4
Utilities	0.8	0.0	0.4	0.0	0.4
Total	155.0	27.1	35.3	59.4	40.8
FCRD					
Total Manufacturing	171.6	10.5	13.8	29.1	15.0
Wholesale Trade	14.6	1.2	2.8	4.9	5.2
Major Transportation	195.9	2.0	2.0	2.0	2.1
Other Transportation	154.2	7.7	8.1	8.5	8.9
Utilities	14.2	2.8	3.2	4.1	5.2
Total	550.4	24.2	29.9	48.6	36.4
LOWER MAINLAND					
Total Manufacturing	3,459.8	162.2	332.3	706.6	295.4
Wholesale Trade	1,135.7	57.9	137.5	230.7	254.4
Major Transportation	4,548.4	45.3	46.2	46.5	47.0
Other Transportation	1,049.8	52.7	54.6	58.2	60.7
Utilities	1,282.5	17.8	18.6	20.6	22.3
Total	11,476.1	335.9	589.2	1,062.6	679.8

*All demand data in this report is derived from the "base growth" projections in the Currie, Coopers & Lybrand study. Low or higher growth projections would result in corresponding adjustments in land demand.

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Because of the trend towards more intensive use of land, and a shift in industrial land use away from Greater Vancouver to other areas of the Lower Mainland, replacement needs for forecast purposes are likely overstated, particularly in the G.V.R.D. This is noted in the demand forecast. Greater Vancouver regional district figures were based on substantial land losses (e.g. False Creek) which can be considered as exceptions rather than illustrative of general trends. For residential areas infrastructure land is generally 25 to 30%, and is not believed to be substantially different for industry. While road and rail right-of-way requirements may be greater, larger industrial development sites (as compared to residential use) compensate for additional right-of-way requirements.*

The project team proposes that a standard gross-up factor of 1.5 be applied throughout the Lower Mainland. This would be comprised as follows:

1.00	actual land demand
.30	infrastructure land needs
.20	replacement land for land lost to other uses
1.50	

We believe this factor to be sufficiently representative for purposes of forecasting.

*An assessment of five industrial areas indicated the percentage of land devoted to infrastructure varying from 12% to 40%, with an average of 25%. The higher ratios usually reflected the existence of a large hydro right-of-way in the area.

3.0 ASSESSMENT OF INDUSTRIAL LAND PLANNING ISSUES

This section of the report provides an assessment of planning issues that influence industrial land use. Several areas were identified in the original proposal for the industrial project, and others emanate from subsequent research and interviews. Each is reviewed and examined in relation to its importance in the industrial land planning process.

3.1 Existing Plans

The entire Lower Mainland, was until November 18, 1983 covered by Official Regional Plans (O.R.P.s) adopted in each instance by the particular regional district having jurisdiction. The Municipal Amendment Act cancelled these Official Plans and they no longer have any legal effect. Although the traditional Official Regional Plans and regional planning process no longer exist, it was the former planning process that identified the need for the current review and assessment of industrial land in the Lower Mainland. Based on development trends, it was perceived that a long-term shortage of industrial land supply could emerge. Subsequently, it was agreed by the four regional districts that the supply and demand for industrial land be reviewed.

The municipalities within the four regional districts have the authority to adopt their own Official Community Plan. Similarly, within electoral areas, regional districts may adopt Official Settlement Plans. Approximately one half of the municipal and electoral areas within the regional districts now have adopted official plans. Each of these include provisions for industrial areas and policies pertaining to industrial development. In many of the other municipalities, including several large ones in the Greater Vancouver area, unofficial policy plans have been prepared to act as a guide to Council in allocating land for industrial development. In reviewing

planning policies with the private sector it was apparent that those interviewed were in basic support of the long-term planning process and very few saw much difficulty with existing industrial policies in either regional or municipal plans. The data base utilized to prepare Plans is also well regarded as a source of information by the private sector. The Plans are perceived to be of particular value in providing guidance to industry and the development community in identifying areas for long term industrial development which reflect a concensus of approval at the political level.

3.2 Zoning Regulations

In examining current zoning regulations throughout the Lower Mainland and reviewing these with the private sector, it was observed that some zoning bylaws are unduly complex in their nature. Two general concerns were identified: i) the number of zones and range of uses permitted within these zones, and, ii) siting requirements.

With respect to zones and uses permitted in each zone there exists a concensus of opinion that in some municipal jurisdictions zoning bylaws contain an undue number of zones which tend to define too narrowly the type of development permitted.* This requires potential users to either locate in specific areas that have been prezoned for their particular enterprise or to become involved in a lengthy rezoning process. When redevelopment is desirable after an industry relocates, the development potential of the vacant building or vacant site is restricted to a minimal number and possibly inappropriate range of uses. This has a negative impact both with relation to the site's capability of accommodating new industrial uses but understandably is also perceived as a hindrance to the investment opportunities associated with that site as the potential variety of industrial uses is quite limited.

*Several major development companies do however impose their own restrictive covenants to control the use and appearance of buildings within their industrial parks.

A related issue is that of the comprehensive development or CD type regulations which exist in some municipalities. These regulations provide the capability to both the municipality and industry to custom tailor regulations to suit a particular industry, but it also opens the land use approval process to negotiations. This introduces uncertainty and can lead to unreasonable requirements which are not applied to industries in conventional zones. Zoning represents local governments only means of controlling land development and protection against incompatible uses. However, in assessing local zoning bylaws it is the project team's opinion that a minimal number of zones permitting a reasonable range of uses be established to accommodate industrial development. This should negate the need for CD type regulations.

3.3 The Development Approval Process

Most private sector concerns with the general municipal planning process are directed towards delays encountered in obtaining approvals for subdivision, zoning, or building permits. This can affect the timing of land supply. There was a feeling that the distinctions and procedures that apply from municipality to municipality create unnecessary complexities to the potentional developer of an industrial site. It was noted that a standard overall procedure throughout the Lower Mainland would greatly assist the development process and reduce substantially the uncertainty that presently exists. This same problem has been raised in a number of previous studies, principally those undertaken as part of the B.C. deregulation review, and by submissions from industry organizations such as UDI and HUDAC.

The project team was also advised of the occasional lack of inter-departmental coordination and sometimes even cooperation that exists in certain municipalities. For example, a developer or industry representative proceeding from one

department to another on occasion has received conflicting advice or instructions. Other instances were mentioned where an application is left with one department for processing by another department but the processing is neglected and the application remains dormant until an inquiry is made by the applicant. While it is recognized that the approval process will mirror the complexity of applications and the needs of local jurisdictions, it is nevertheless felt desirable to periodically review these in order to establish whether improvements are possible.

Another aspect of the approval process is that of payment of development cost charges. These cost charges are imposed by local government to assist in defraying the cost of infrastructure such as utilities. While there is appreciation of the need for development cost charges, it was indicated that these charges should not be imposed until the building permit stage of development. This diminishes the impact on cash flow at a time when frontend costs to a developer or industrial enterprise are particularly onerous.

There are substantial variations in methodology and application of development cost charges in the Lower Mainland. However, the project team did not note any particular problem with the application of these, although not surprisingly the cost charges are reflected in property market prices. Where these cannot be passed on directly to the purchaser by way of a surcharge on the land price, the land price will be raised (assuming market forces allow this) to incorporate the development cost component. Where new charges are imposed for the first time, as in the Mufford area in Langley, the vendors asking price may have to be lowered to absorb the development cost charge in order to maintain a competitive land price.

Mention was also made of occasional problems that exist with respect to obtaining approval where conceptual design layouts are prepared and adopted as policy documents. While these plans, if prepared in a generalized manner are helpful, there are occasions where the degree of detail removes all flexibility in accommodating an industry. A few development industry representatives suggested that sometimes staff tends to be defensive due to the efforts directed to the preparation of such a plan and resists proposals for modification. It was noted that in some cases these plans tend to be insensitive to the development requirements of industry as well as to marketplace economics by specifying particular locations or sites which are not necessarily the most appropriate.

3.4 Land Banking

Land banking involves the process of acquiring blocks of land in advance of short or long-term requirements for industrial development. It has included both the private and public sectors, noteably Burnaby, Richmond, Surrey, North Vancouver, City of Vancouver, Mission, Maple Ridge, B.C.D.C., Grosvenor International, Marathon Realty, and B.C. Hydro. Several smaller municipalities and private sector organizations have from time to time also pursued land banking. It was a particularly popular form of acquiring land in previous decades. Since the economic recession experienced during the early 1980's, there has been a marked change in attitude towards land banking. The cost of money and reduced demand has made long term land banking prohibitively expensive. Almost without exception, municipal and other government involvement in land banking has diminished substantially. Discussions with the private sector revealed that while there is still interest in land banking the time frame for such activity has been reduced from the long or even very long-term to a period generally not exceeding the anticipated demand for five years. In the public sector, an exception might be Burnaby which has

in obtaining a substantial amount of land to commence its land banking program during tax sales in the 1930's. To a lesser degree this has also been the case with industrial land banking in the District of North Vancouver.

The objectives for land banking are not always the same. The public sector, such as municipalities, generally initiated land banking as a result of land obtained through tax sales in the 1930's. Land banking has subsequently been used:

- to provide a financial return to the municipality from land sales,
- to act as an incentive to industrial development by making serviced land available at market or below market prices, and
- to provide direct municipal control over land use and site development.

The objectives of the private sector are profit oriented. The developer, by acquiring land for industry in advance of need, sees an opportunity of earning a reasonable return on his investment by fulfilling a market demand for industrial land. The land is normally sold (or leased) over a period of time in response to supply and demand pressures. By ensuring a high standard of development, as found in most Lower Mainland estates, the developer not only protects his investment, but also that of his industrial client.

Crown corporations such as B.C. Hydro and B.C.D.C. are playing a different role in land banking. B.C. Hydro has traditionally acquired land along its valley rail lines to attract industry in order to generate rail freight traffic. While the demand for rail siding has diminished, the Corporation's land development goal, that of generating freight traffic, remains substantially the same.

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B.C.D.C. has, through its past mandate, acquired land where the private sector has been unwilling or unable to make land available for industrial development. Its projects such as Maple Meadows and Tilbury Island have attempted to fill a market void, with mixed success. At present B.C.D.C. is re-examining its role and is in the process of defining a new business strategy.

While financial restraint and the slump in economic development has substantially reduced the public sector role in land banking, it is the opinion of the private sector that there is very little requirement for public sector land banking. It is argued that if the demand exists, it is in the private sectors interest to fulfill this demand. It is agreed that long-term land banking is likely to diminish in view of recent economic conditions. Nevertheless, the private sector expects to continue its role in land banking for industry albeit at a somewhat reduced scale and most certainly for a much shorter time frame.

The requirement for land banking really hinges on the objectives of the program. If the objective is to simply provide land for industrial development and the market perceives a need, this need can be met by the private sector. If, however, the objective is to provide both control over development and possibly cashflow to the municipality then there would appear to be little reason to discourage municipalities from the land banking process assuming it is in response to demand.

3.5 Pre-Zoning, Pre-Servicing, and Replotting of Industrial Land

Pre-Zoning and Pre-Servicing

A further area that has been debated for some time is the desirability of having industrial land pre-serviced and pre-zoned. It was found that particularly within the G.V.R.D.

and to a lesser extent in the C.F.V.R.D. and D.A.R.D. the majority of municipalities will supply trunk services to key industrial areas and at the same time zone these areas for their intended use. Conversely, in cases where land is designated by Plan for industrial purposes but not serviced the areas have generally not been pre-zoned. It should be noted that in Fraser-Cheam minimal vacant pre-serviced industrial land is available largely as a result of high development costs and limited demand, with some exceptions within the urban areas of Chilliwack and Hope. Larger areas outside of the urban communities have on the whole not been pre-serviced.

Pre-servicing has been undertaken by several municipalities in areas where historic lot patterns and a multitude of ownership prevented an owner of supplying services to a site. In some instances, as for example in Coquitlam, the municipality undertook servicing on its own due to the difficulty of obtaining agreement from the large variety of owners and as a means of stimulating industrial expansion. Predominantly, onsite servicing is the responsibility of the developer, a procedure which the development community is essentially in concurrence with.

One of the few examples of an unserviced industrially designated area being pre-zoned is Queensborough in New Westminster. This area however is expected to experience more intensive industrial development in future as the Annacis bridge crossing is completed. Further rezoning required at that time will enable the municipality to exercise control over development. Many areas with unserviced industrial sites particularly those in the upper Fraser Valley are constrained by demand and cost. Insufficient interest due to a perceived lack of demand has prevented both the private and public sectors from servicing these sites.

By prezoning serviced land, several additional advantages accrue to both the private and public sectors. The application of industrial zoning to areas intended for this type of development ensures that incompatible uses are restricted. Some jurisdictions do however permit residential uses within industrial zones. This practice can result in residential subdivisions which severely affect the ultimate industrial use of the area. If industry is desired, single family dwellings should be prohibited. Limiting incompatible uses reduces complaints which provides a positive climate for industrial uses and also benefits local government. The process of rezoning which can be administratively cumbersome and time consuming is also avoided.

Replotting

Some older areas in the Lower Mainland with awkward or haphazard lot developments may be well suited to industry, but only when a more practical subdivision pattern is developed. Replotting would permit more reasonable road patterns, provide for better shaped lots, and optimize the use of land. Provisions in the Municipal Act (Sections 886-918) provide for replotting and, while time consuming, can be of considerable long term benefit. In several portions of the region (e.g. the Western Industrial Area in Matsqui), the use of replotting will provide for more attractive industrial properties.

Local government, and the private sector do not always have the means to actively pursue replotting and land purchase of older developed areas. While the number of instances are relatively few, it nevertheless is a problem that could be alleviated by a revolving fund made available specifically for this purpose. Assistance should be considered at the provincial level, designed to aid smaller communities with limited resources to bring such land on stream for industrial use.

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3.6 Development Intensity

Industrial zoning regulations must be of a nature to ensure that the limited supply of industrial land is used to its best advantage. To address this issue the project team reviewed this question with all of the private developers to determine market trends and to ascertain the significance of this issue.

The concern at the local government level was whether the existing regulations tend to reduce the capability of industry to maximize use of property resulting in densities lower than might be achieved otherwise. In examining this with the development community it became apparent that in the majority of instances the municipal and regional regulations which govern site development such as site coverage, yard setbacks, floor area, floor space ratios and similar provisions were more than adequate to meet the requirements of industry. It was stated that new industrial development generally proceeds at site coverage ratios of about 30 or 40 percent intensifying over time as more space is needed for expansion. Rarely will development exceed 60 percent coverage in order to accommodate adequate truck movement and to ensure sufficient employee parking.

There was agreement throughout the private sector that the intensity of development is a reflection of land prices and interest rates associated with holding costs. High land costs and high interest rates result in a need to conserve funds. This is achieved through the maximum utilization of land. Increased densities, as noted in the Currie, Coopers & Lybrand study result in lower demand for land. This is particularly true within the G.V.R.D. which has the highest land values in the Lower Mainland. Similarly, it can be expected that with time the intensity of development will increase in the upper Fraser Valley districts although the relative cost of land is lower here, which in turn is reflected in lower development densities vis a vis the GVRD.

Industry is making better use of land resources, and existing surplus lands are either being subdivided off or are built on with the intention of subleasing buildings to other users.

The District of Surrey also controls density by carefully selecting industries for lands owned by the municipality. A development plan for these properties is mutually agreed to with the client and a buy back agreement is entered into in the event that the developer fails to meet his obligations.

The Grosvenor International development on Annacis Island in Delta is also witnessing a greater intensity of use in comparison to development that occurred in earlier years. Queensborough in New Westminster is illustrative of another area where development density is increasing. The latter two areas are expected to experience greater increases in development intensity with the completion of the Annacis Bridge.

An interesting trend with respect to development density is one where industry is establishing in older downtown sites where land values may have decreased and traditional commercial uses are moving out. The industrial uses tend to be relatively compact and site intensive. This has been noted, for example, in parts of Chilliwack and is a strategy being encouraged in New Westminster. In conclusion, density is a reflection of market forces of demand and supply. Where supply is adequate and demand is low, density also tends to be low. Where the supply is more limited and the development pressure is intense, it is reflected in high land values and a consequently greater intensity of development. From a planning perspective land use intensity does not appear to be a subject which requires remedial action in land use regulations.

3.7 Summary of Recommendations

Based on our assessment of the issues reviewed in this section, it is proposed that the following points be considered for incorporation in strategy recommendations:

1. That existing Plans and data be maintained, and continue as a guide to the public and private sectors in delineating areas deemed appropriate for long term industrial use.

2. That the number and complexity of industrial zones be reviewed to provide reasonable flexibility to potential users.

3. That the land use and development cost charge approval process be reviewed to determine whether the process is equitable and prompt in relation to local requirements.

4. That conceptual development plans intended to guide development in industrial areas be sufficiently flexible in relation to market forces.

5. That public sector land banking be clearly defined as to its objectives, particularly in relation to demand and the ability of the private sector to satisfy this demand.

6. That consideration be given to the establishment of a modest revolving fund for land assembly and replotting in small lot areas designated Industrial, but used for non-industrial purposes.

7. That industrial areas which have adequate utility services be pre-zoned for their intended use and that in such pre-zoning no uses be permitted which frustrate the purpose of these areas.

4.0 TRENDS IN INDUSTRIAL LAND DEVELOPMENT

Increasing land prices, congestion, and a shift of the market away from Vancouver has had a persistent and continuous effect on the demand for industrial land in other Lower Mainland centres. This is borne out by the CCL demand studies which note that:

- The G.V.R.D. will lose share of total B.C. manufacturing output.

- The C.F.V.R.D. also declines in attractiveness to industries sensitive to land prices, such as metal fabricating and forest products.

- Improved accessibility of D.A.R.D. and Fraser-Cheam will improve the relative attractiveness of these regions despite increasing land values.

Interviews carried out as part of the strategy formulation revealed a number of other significant trends or characteristics which have important strategy implications. These include basic structural adjustments in the economy, the rapid advent towards intermodal operations, the increase in development density, the growing trend towards quasi-industrial development, and the business turn-over associated with smaller sites and buildings. This section examines these trends in more detail.

4.1 Structural Changes in the Economy

Significant changes are occurring in the economy which are having a particularly pronounced effect on industrial land use in the Lower Mainland. These changes involve:

- A trend away from resource processing and manufacturing towards distribution and warehouse activities.

- A trend towards capital rather than labour intensive industrial activities.

The Canadian economy, and B.C.'s in particular, is seriously affected by world trends, which have resulted in a lower demand for our traditional resources.

In addition, B.C.'s volatile labour climate and labour rates and general high production costs have in a number of instances led to a contraction of industrial activity, or a shift to processing by parent companies located in eastern Canada. Lower Mainland industrial sites are being utilized, to a greater degree for distribution and related activities. This shift in demand towards sites for service industries and warehouse and distribution activities is significant as these activities are space consuming, and are capital rather than labour intensive. This is not to suggest that warehousing and distribution will be the prime factor in land consumption. Manufacturing continues to dominate, and is especially prominent in Dewdney-Alouette and Fraser-Cheam, but the relative share of warehousing and distribution will gradually increase.

The expanding local market, export, transportation and communication activities, coupled with increased emphasis on technological change, will result in an even greater growth in the service sector in British Columbia.

The trend toward distribution and warehouse activities and an orientation to serve local markets suggests that future industrial locations will be more flexible as to siting rather than being dependent on specific site characteristics normally associated with resource processing and manufacturing. This trend, supported by demand figures indicates that one of the prime requirements for land will be related to the wholesaling, distribution and warehousing sector, implying locations well situated with respect to market, and surface transportation.

4.2 Growth of Intermodal Operations

Partly as a result of a shift away from manufacturing and the increased emphasis on distribution (and export) activities in the Lower Mainland, there has been a corresponding growth in intermodal facilities. Intermodal operations involve the shipment by rail of containers and truck trailers to a central terminal from where containers are distributed by local truckers, or picked up by the client. The growth of intermodal facilities is having a particular impact on rail siding requirements, since industries previously requiring rail access can now choose to do without. While rail sidings are still important to manufacturers, processing industries and other frequent users, truck traffic has replaced their need for more infrequent users. The most recent facility has been developed by CP Rail at Mayfair Industrial Park in Coquitlam, a site which also has good freeway access. Other railways such as B.C. Hydro, CN, Burlington Northern, and B.C. Rail are also experiencing continued growth of intermodal traffic, and a lesser demand for rail sidings. Again the implications for planning purposes are important:

- A gradually declining demand can be anticipated for industrial areas with provision for rail sidings.

- Locations of industrial land with the capability of offering intermodal facilities (e.g. highly accessible rail/road or rail/road/sea transport sites) will be important.

4.3 Increase in Development Density

One of the most pronounced trends in industrial land development is that of increased development density. This is particularly true in the G.V.R.D. where land values are high, and strong pressures exist for the conversion of industrial land to other more profitable uses. As earlier discussed, interest

carrying costs and land prices are the principal motivating forces that have led to higher densities. The nature of development is determined by affordability. This has manifested itself in the following trends:

- Land is purchased in the smallest possible parcel that will accommodate the requirements of industry.

  This does not necessarily mean that more small parcels are being bought, but it does imply a trend away from retaining land in inventory for future expansion. Some exceptions exist for large national organizations, and for manufacturing or processing plants where the investment in facilities makes relocation impractical (e.g. chemical, forestry).

- Virtually no land is purchased for 'investment purposes'.

  In conjunction with purchasing only the amount of land actually needed, very few firms or individuals buy land for its investment potential. Several of those interviewed indicated that even the long-term resale value of a building was rarely considered by the purchaser. For example, on occasion it is indicated that by constructing higher ceilings, or modifying the structure the long-term potential of the building would be enhanced. Purchasers buy land only for their specific requirements and construct to suit only their particular purpose.

- Expansion is provided for through technological productivity improvements and by sub-leasing initial surplus space.

  To accommodate potential expansion needs, there is a trend to build to the maximum feasible coverage, and to lease out those parts of the building surplus to immediate requirements. Expansion is thus met by growing into the sub-leased areas. Also, the rapid advance in technology and the

replacement of labour input by capital permits firms to more readily accommodate expansion within existing sites and buildings. Even in older buildings in-house plant alterations, more efficient lay-out, and other production improvements are contemplated before consideration is given to a new site.

- In high land value areas a trend is anticipated through accommodating industry by the use of multi-storey buildings.

  While no clear evidence yet exists, inquiries are being made about possible multi-storey facilities to accommodate future manufacturing and warehousing activities. The only areas where this may prove feasible is in Vancouver and immediately surrounding areas, and even then it would be practical only for specialized uses. Common use of elevators, loading bays, and the difficulty of accommodating multi-storey activities mitigate against multi-storey operations. Nevertheless, some specialized manufacturing, research, and distribution can, and has been carried out through multi-storey facilities.

  The results of this development intensification may act to optimize use of available supply, and lead to lower land demand than has been forecast.

4.4 Trend to Quasi-Industrial Development

One of the most pervasive trends, and difficult to accommodate in traditional planning methodology, is that of retail oriented industrial development. It further blurs the line between what is characteristically known as commercial development and that of industrial uses. By quasi-industrial uses we refer to those industrial/commercial distribution centres which are retail oriented, but which as a component of their operation require

substantial indoor or outdoor merchandise inventory areas. Examples would include furniture warehouses or furniture manufacturers, home improvement centres, and other distribution centres which retail their merchandise from the warehouse within the same premises. These uses do not generally locate on expensive prime commercial sites, but gravitate towards lower cost but high visibility industrial or fringe industrial areas. While this type of development is particularly prominent in the suburban municipalities of Surrey, Richmond, Burnaby, Coquitlam and Langley, it is also occurring at other locations. Almost all these uses are characterized by sites along or visible to major roads, extensive parking areas, and large building premises.

Most municipalities are beginning to deal with them by creating special "service-industrial" zones or equivalent commercial zone categories. The uses do not readily fit into traditional commercial areas since they are not pedestrian oriented, require large parcel sizes, and tend to require or generate considerable truck traffic. This development is also illustrative of the growing trend towards merchandising from distribution warehouses to reduce the need for investment in retail facilities, and to better accommodate the new and sizeable valley suburban markets.

While it can be argued that such developments are essentially commercial in nature, they nevertheless involve significant warehouse or storage space which lends itself better to industrial area siting, since in traditional commercial areas such space would do little to enhance the retail commercial environment.

For planning purposes this trend implies a need to consider favourably the development of some quasi-industrial uses for industrial sites with good major road access.

4.5 High Turn-Over of Small Sites and Buildings

Interviews with representatives of the industrial development sector indicated the occurrence of a substantial and almost continual turn-over of businesses on small sites or within smaller premises. The reference was generally to spaces ranging in the 150 to 300 m^2 range. This implies that while demand may appear strong, especially if based on business license applications, failure rates tend to be high and need to be considered in evaluating local demand trends. Cited as contributing factors to this high turn-over rate were:

- The very high small business failure rate due to poor business plans and inadequate capitalization.

- The requirement of those businesses that are successful to move to larger spaces in order to accommodate expansion requirements.

On balance, the large failure rate would appear to be a far more significant factor than the need to obtain larger premises.

This degree of business turn over suggests that local demand forecasts must be cautious in utilizing building or occupancy permits as a guide. Clearly, equal consideration must be given to business failures and departures, otherwise demand data will result in over estimates.

4.6 Strategy Implications

Our review of trends in industrial land development suggests that several aspects deserve consideration in the establishment

of an overall industrial land strategy. The following is a summary of our principal observations:

1. The increasing significance of warehousing and distribution activities, which is especially prominent in the GVRD and Central Fraser Valley, will be manifested in a demand for sites with excellent access or exposure to transportation routes.

2. Growth in intermodal traffic will increase the feasibility of industrial activities to occur away from sites with acess to rail ridings. This is especially so for service industrial activities rather than manufacturing and processing.

3. The trend towards greater intensity of land use, may lead to lower than expected demand projections. This suggests that it is critically important to monitor development trends and land use if future planning in the lower mainland is to accurately reflect and anticipate industrial land requirements.

4. The development of large service-industrial or quasi-industrial activites which have both a commercial and industrial component will generate a demand for industrial land which is located in major suburban markets with good visibility or access to major traffic arterials. In industrial areas which offer these characteristics, some advance provision should be made for this type of activity.

5. Through monitoring of industrial uses, consideration must be given to not only the issuance of new business licenses, but also to business failures, since otherwise demand for land may be exaggerated.

5.0 ANALYSIS OF PHYSICAL CONSTRAINTS ON SUPPLY

5.1 Overview of Land Supply

There are several physical factors which can act as constraints on supply. These include the location of the industrial area, floodplain restrictions, and geotechnical conditions. As part of this project, special attention was given to reviewing floodplain and geotechnical conditions in relation to supply. This is discussed later in this section.

It can be argued that poor location of a proposed industrial area may be so detrimental as to preclude such a site from industrial use. However, a poor location in the context of conditions today, may well prove to be a reasonable site ten or twenty years from now when locational infrastructure requirements are much improved. For example, outside the G.V.R.D. many firms today favour a location south of the Fraser River because of excellent freeway and railway access. However as roads are improved north of the Fraser River, noteably the completion of the Mary Hill bypass, sites here will become increasingly accessible.

Similarly, market shifts eastward will gradually improve the locational attributes of sites in Fraser-Cheam, several of which can only be considered of marginal value in today's market climate. Industry is no different from any other land use component, and will first develop those sites which are most readily accessible, leaving the less attractive areas until last. It is important, however, to recognize the dynamic characteristics of land use activity which entails responses to changes in the economy, shifting markets, new means of transportation and access, and fluctuations in land values. Twenty years ago, areas now developed for industry such as the Mayfair Industrial Estate, would have been difficult to envisage as industrial sites. However, economic forces and

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infrastructure improvements have made this and other developments possible. Given these constantly changing forces it does not appear reasonable to discount any of the designated industrial areas from industrial use.

5.2 Geotechnical Constraints on Supply

Many of the remaining and lesser developed industrial areas in the Lower Mainland are known to be characterized by a number of limitations imposed by geotechnical constraints.

To quantify and evaluate the degree of difficulty imposed by these factors, and to determine whether any areas should be deleted from supply, the geotechnical engineering firm of Golder Associates was assigned to carry out a preliminary review of locations in the central and western Lower Mainland for which reasonable data was available. A summary of their findings follows. A brief review of the geotechnical factors that were examined is also included.*

5.2.1 Procedure

The geotechnical evaluation of the designated industrial areas is based on information on the surficial geologies of the areas published by Geological Survey of Canada, the results of numerous geotechnical investigations previously carried out by Golder Associates in the vicinity of the areas, and information on the geological hazards in the areas published by the Ministry of Environment of the Province of British Columbia. Much of the data is general in nature and is not sufficient for geotechnical design of industrial development in the areas. However, in most cases, the data is sufficient for preliminary evaluation in terms of the feasibility of industrial development.

*A more detailed review is contained in Preliminary Geotechnical Evaluation of Potential Industrial Areas, Lower Fraser Valley, Golder Associates, December 1983.

The geotechnical assessment included the following factors:

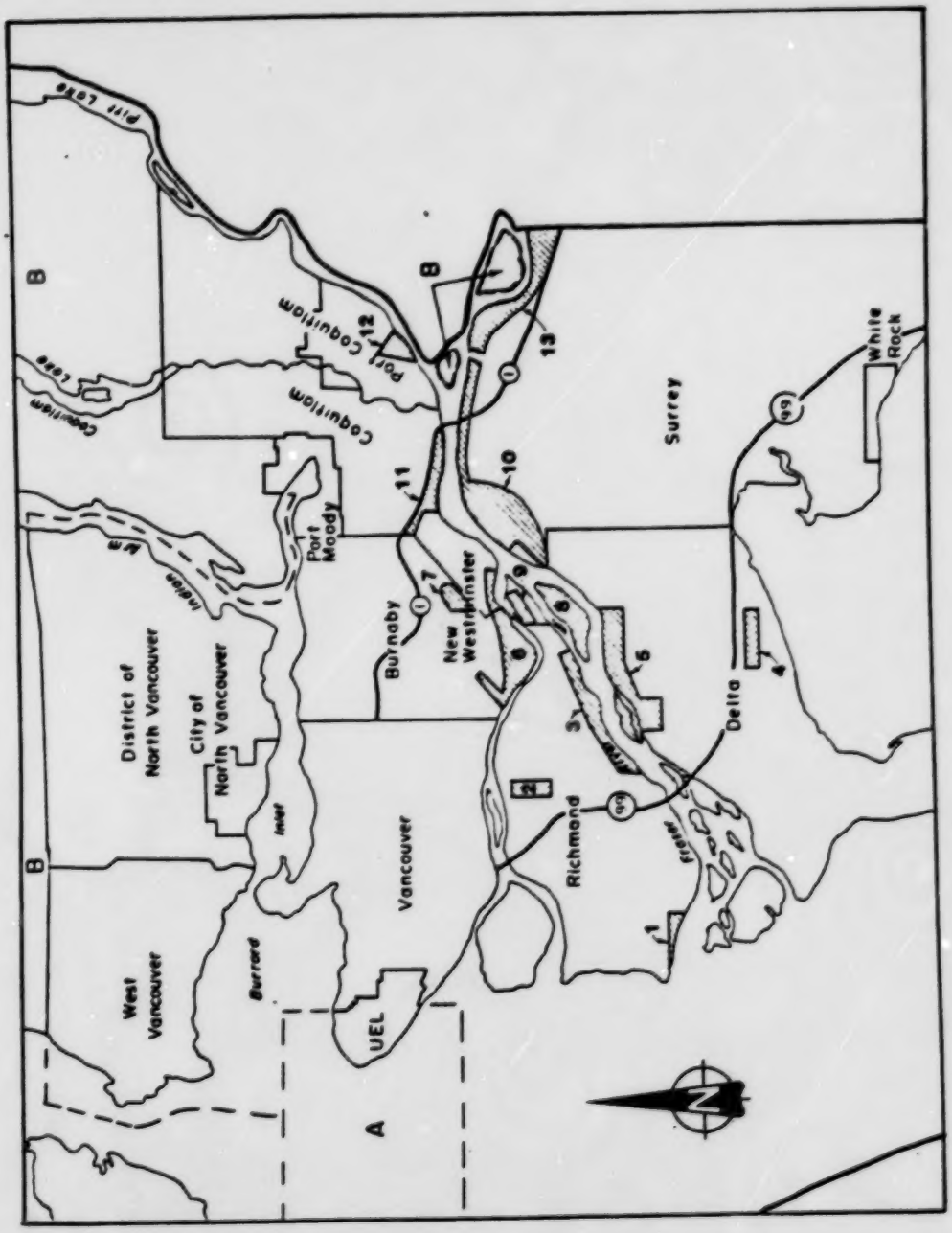
1) Overall site stability
2) Seismic stability
3) Flood susceptibility
4) Foundation conditions
5) Ground water conditions
6) Requirements for treatment of adverse site conditions

The areas considered in this study are located within the Central Fraser Valley, Dewdney-Alouette, and Greater Vancouver Regional Districts. The locations of the potential industrial areas are indicated on Figures 4 and 5, which follow this page and include the following:

Map Number	Site
1	South Steveston
2	Central Richmond
3	South Richmond
4	South Delta
5	North Delta - Tilbury Island
6	Burnaby - Big Bend
7	Burnaby - 19th Street
8	Annacis Island
9	Queensborough Tree Island
10	South Westminster - Bridgeview - Port Mann
11	Fraser Mills
12	Port Coquitlam
13	Northeast Surrey
14	Maple Meadows
15	Northwest Langley
16	Albion
17	Clearbrook
18	South Mission

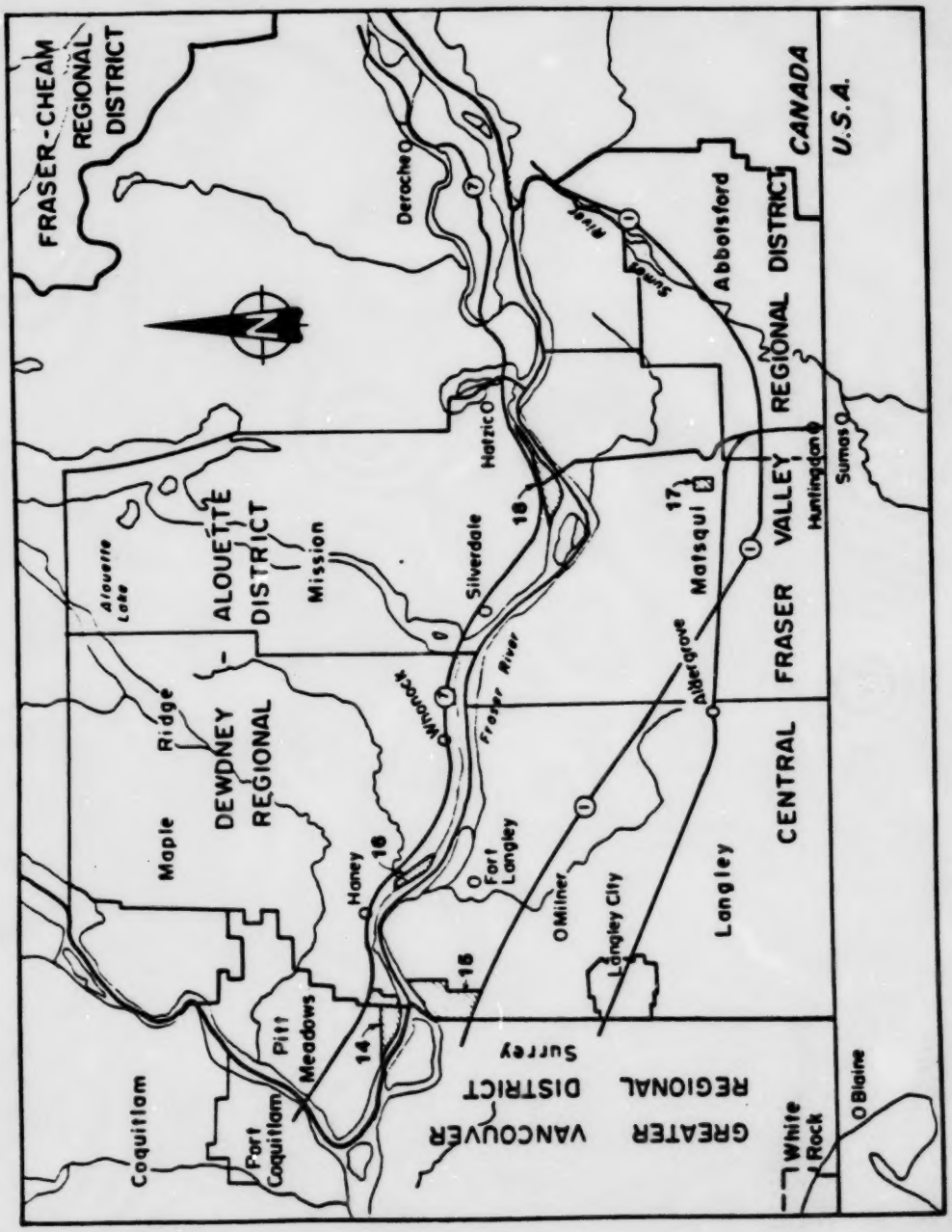
GREATER VANCOUVER REGIONAL DISTRICT

Figure 4



DEWDNEY-ALOUETTE REGIONAL DISTRICT and CENTRAL FRASER VALLEY REGIONAL DISTRICT

Figure 5



To provide an indication of the relative suitability of the various soil types for industrial use, Table V-1, has been prepared which classifies industry by tolerance to soil settlement. Following the description of each soil group, a short summary is given, indicating the relative ease by which this soil type can be used for one or more of the industrial classifications described in Table V-1. A comprehensive sumary of all information follows at the end of the geotechnical evaluation in Table V-2.

TABLE V-1

DEVELOPMENT CATEGORIES DERIVED FROM GEOTECHNICAL CONSTRAINTS

CATEGORY	DESCRIPTION	TYPICAL DEVELOPMENT
A	Heavy Structures	- Smelting Plants - Sawmills - Cement Plants - Machinery Plants
B	Light to Medium Structures - Settlement Sensitive	- Light to medium structures with settlement or alignment sensitive equipment, brittle cladding or internal finishes
C	Light to Medium Structures - Settlement Tolerant	- Light to medium structures of settlement tolerant design and finishings, without alignment or settlement sensitive equipment
D	Exterior Storage	- Building Products/Materials Yards - Machinery Depots - Transportation transfer (trucking, etc.,) stations

5.2.2 Natural Hazards

Identified natural hazards include flooding, slope instability and seismic instability. All of the sites except for part of Northwest Langley, and Clearbrook and all of 19th Street in Burnaby lie below the 200 year flood level. Most of these areas are, however, protected by 1:200 year dykes.

Areas with steep soil slopes are commonly subject to shallow movement due to soil creep or surficial sloughing. Small scale slope failures are known to occur on the steep hillside above South Westminster and Bridgeview and to the west of Albion.

All of the areas are located within seismic risk zone 3, the zone of greatest risk of strong earthquakes in Canada. Earthquakes can cause failure of otherwise marginally stable slopes. This should be assumed to be a potential hazard in areas with a history of slope failure such as the steep hillsides in the earlier mentioned Bridgeview and Albion areas.

5.2.3 Glacial and Interglacial Deposits

1. Glacial Till

These deposits generally occur in upland areas of the Fraser lowlands and were deposited beneath glaciers. They are typically silty materials of varying clay, sand, gravel, and cobble contents.

Sites underlain by glacial till are generally suitable of all categories of development. The general characteristics of these deposits and requirements for industrial development on them may be summarized as follows:

- good bearing capacity with low settlement;
- conventional footing foundations generally suitable;

- grade support of floor slabs on normal granular base courses;
- flexible pavements durable with adequate drainage;
- site grading and excavation present few difficulties;
- excavated materials marginally suitable for use as grade or structure fill due to its silty nature.

These soils are suitable for all development categories described in Table V-1.

2. Glacial Drift, Glacio-Fluvial and Outwash Deposits

These deposits in upland areas of the Fraser lowlands were deposited by the action of glaciers and glacial streams.

Sites underlain by these deposits are generally suitable for all categories of development. The general characteristics of these deposits, and requirements for industrial development on them, may be summarized as follows:

- good bearing capacity with low settlement;
- conventional footing foundations generally suitable;
- grade support of floor slabs on normal granular base courses;
- flexible pavements durable with adequate drainage;
- site grading and excavation present few difficulties;
- excavated material generally suitable for use as grade and structure fill.

All development categories are appropriate on these deposits.

3. Uplifted Glacio-Marine Sediments

These sediments were deposited during or following the final glacial recession and are present at or near ground surface in both upland and lowland areas. These sediments

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generally consist of silts and clays to stoney silts and clays. In some of the upland areas, drainage and dessication (drying) of the deposits has produced very stiff materials which are competent for structural support. In other areas, the sediments are softer and more compressible.

Ground water levels in these areas are generally high and surface drainage is generally poor.

The general characteristics of these deposits and requirements for industrial developments on them may be summarized as follows:

- bearing capacity and settlement of conventional footings dependent on depth of surface desiccation;

- preloading may be required to reduce post-construction settlement of footings or floor slabs in areas of softer sediments, depending on loading and depth of desiccation;

- grade support of floor slabs on normal granular base course;

- pavements frequently require additional granular thicknesses for heavy traffic;

- materials difficult to excavate to large depths;

- excavation spoil marginally suitable for use as site grading fill, and generally not suitable as structural fill.

These deposits are generally suitable for development category C, that is light and medium structures.

4. Raised Beach and Deltaic Deposits

These soils typically consist of sands and gravels and are present at isolated locations within the upland areas. These deposits may, depending on their thickness and underlying deposts, be suitable for any form of development. The general characteristics of these deposits and requirements for industrial developments on them may be summarized as follows:

- good bearing capacity and moderate settlement, provided thickness of deposit is sufficient and underlying soils are competent (may not be the case at Sites 13, 14, and 15, i.e. Northeast Surrey, Maple Meadows, and Northwest Langley);

- conventional footing foundations generally adequate (special treatment may be required at Sites 13, 14 and 15);

- grade support of floor slabs on normal granular base courses (preload treatment may be required at Sites 13, 14 and 15);

- flexible pavements generally durable (preload treatment may be required at Sites 13, 14 and 15);

- excavation spoil requires careful selection to permit use as grade or structural fill.

These soils are suitable for all development categories described in Table V-1, but special treatment may be necessary in Northeast Surrey, Maple Meadows and Northwest Langley.

5.2.4 Post-Glacial Deposits

1. Fraser River Sediments

The Fraser River sediments were deposited over and against the older glacial deposits predominantly along the low-lying margins of the Fraser and Pitt Rivers and in the Fraser Delta. They are typically 10 m or more in depth, increasing to hundreds of in metres thickness within the Fraser River Delta. These materials are looser or softer to significant depth, and offer less competent support for structures than do the glacial and interglacial deposits.

Fraser River sediments constitute the most frequently encountered subsurface conditions at the industrial sites.

The general characteristics of these deposits and requirements for industrial developments on them may be summarized as follows:

- surface bearing capacity low;
- conventional footings possible for light to moderate structural loads with special treatment (preloading and placement of granular bearing layer may be required);
- piled foundations required for concentrated loads;
- densification of loose soils required for major or critical structures and shoreline developments to reduce risk of liquefication during earthquakes;
- floor slabs typically require preloading and granular drainage layer;
- preload treatment may be required for pavements, depending on loading;

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- difficult excavation below ground water table;

- saturated or silty portions of excavation spoil not suitable for use as site grading fills; sandy excavation material is marginally suitable for grade or structural fill if drained.

These deposits may usually be readily developed for light or medium structures, (categories B, C, and D), and can be used for heavier structures with special treatment.

2. Aeolian Deposits

Aeolian (wind-blown) deposits range from sands to silts, and generally have a very loose soil structure which may be subject to collapse upon loading and wetting. Aeolian deposits occur locally in the upland areas within the eastern portion of the study area, and are present in the southern portion (about 30 per cent) of the Clearbrook area, where they are underlain by outwash deposits.

Because of their instability, these deposits should be removed from building and other important areas of industrial developments. Alternatively, they may be densified.

3. Bog, Swamp and Lowland Lake Deposits

Peats, organic silts and clays have been deposited on low-lying areas including the Fraser River Delta, the margins of the Fraser, Pitt, Serpentine and Nicomekl Rivers, and at islolated upland locations. These soils are generally highly compressible and very weak, particularly in the case of the peat deposits, and may generate combustible gas as a result of long term decomposition of the organic materials. The groundwater levels in areas of these deposits are generally at or near ground surface throughout the year.

The general requirements for industrial developments on them may be summarized as follows:

- low shear strength and bearing capacity;
- high settlements due to surface loading and/or dewatering;
- unsuitable for structural support. Structural support normally provided by piles driven to competent bearing stratum at depth where practical;
- venting or control of combustible gas buildup beneath structures;
- height of grade and preload fills restricted by low strengths and instability, particularly in areas where peat is underlain by soft clays (e.g. in Clearbrook);
- staged grade and preload fill construction normally required;
- minimum of 0.9 m of granular fill normally required for surface trafficability;
- continuing long term settlement of grade fills, even after preload treatment;
- differential settlement of grade fills and floated services relative to pile supported structures;
- poor pavement durability;
- excavation difficult, may adversely affect site stability;
- excavation spoil not suitable for use as grade fill.

In areas of thin peat, at the margins of these deposits, excavation of the peat may be used to reduce the settlement of structures and grade fills.

These areas are readily developed only for storage and transportation uses (category D) without special treatment.

4. Man-Made Deposits (Fills)

Man-made deposits, or fills, vary widely in character from mineral fills to wood waste and refuse, and are present locally throughout the Fraser lowland.

Wood waste and refuse fills offer poor structural support. Further, decomposition of these materials produces methane gas and possible leachate flow into the groundwater system.

The wood waste and refuse fills are considered to be unsuitable for structural support, but may be suitable for exterior storage. The general characteristics of these fills and requirements for the development of sites underlain by them may be summarized as follows:

- low bearing capacity;
- high settlements;
- methane gas production;
- removal of fills or piled foundations extending to competent natural strata required for structure;
- pile supported floor slabs usually required;
- pavements subject to settlement and cracking;

- control and venting of methane gas required;

- excavation difficulty variable;

- excavation spoil unsuitable for use as grade fill.

The types of industrial use for which sites overlain by mineral fills may be readily developed depends upon the quality of the fills and the underlying natural soils. Where the fills are properly controlled and compacted, the development of the site characteristics and requirements for development may be assumed to be similar to those of unfilled sites of the same underlying silt types. Where fills are of poor quality material or are improperly compacted, they may require excavation and recompaction or treatment by methods such as dynamic compaction to improve their bearing capacity, reduce settlements and prevent liquefaction.

5.2.5 Summary of Geotechnical Constraints

A matrix summary has been prepared which evaluates the development potential of all the examined industrial areas in relation to geotechnical constraints. The summary, Table V-2, is included at the end of this sub-section. In the final column of the matrix an "ease of development rating" is included. This indicates the relative ease of development for each of the eighteen industrial areas, in relation to the four industrial development categories. The ease of development rating consists of three levels of difficulty:

Rating

1. Conventional development requirements
2. Moderate additional remedial measures required in relation to rating 1
3. Difficult development

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For example, site 4 (South Delta) consists of 100% Fraser sediments. By examining the final column in the matrix, it may be observed that:

- this site is difficult to develop for heavy structures
- the site is moderate to difficult to develop for settlement sensitive light to medium structures
- is moderately difficult to develop for settlement tolerant light to medium structures
- presents no unusual problems for exterior storage uses.

Where a site consists of several soil types, the ease of development rating is stated for each soil type. The approximate portion of each soil type in an industrial area is also indicated in percentage terms.

The matrix also specifies the type of treatment likely required to accommodate any of the four industrial categories. Lower case letters are used to denote uncertain uses or uncertain use areas, while X indicates that the suggested treatment would apply to all use classifications, except use D, (storage uses) for densification of liquefiable soils.

A review of the matrix reveals the following important points.

1. All of the sites examined in relation to geotechnical constraints have at least some potential for industrial development, even though this may be restricted to storage and transportation uses.

2. The sites with the most difficult development conditions (based on over 50% of the site having a class 3 rating in relation to ease of development for categories A, B, and C) are South Richmond, Queensborough Tree Island, South Westminster - Port Mann - Bridgeview, and Port Coquitlam.

3. The above named sites require more than the usual remedial work. Structures may, for example, need pile support or flexible floor slabs due to significant settlement of underlying material. In South Richmond, the sanitary landfill site is in addition characterized by peat compression, refuse decomposition and the generation of methane gas.

4. Based on the fact that geotechnical considerations do not totally limit development on any one site, it is the opinion of the project team that all of the examined areas can justifiably be considered as a valid component of the supply of industrial land. It must be recognized that the relative suitability for development of these sites can vary greatly, and this must be considered in any local municipal industrial development strategies. Almost all of the sites reviewed can, however, with remedial action (sometimes at considerable cost), be developed for a great variety of industrial uses.

TABLE V-2 GEOTECHNICAL EVALUATION - POTENTIAL INDUSTRIAL AREAS

SITE	POTENTIAL NATURAL HAZARDS(1): Below 200 Year Flood Level	POTENTIAL NATURAL HAZARDS(1): Instability	POTENTIAL NATURAL HAZARDS(1): Liquefaction During Earthquake	PROBABLE SITE DEVELOPMENT REQUIREMENTS AND TREATMENTS BY USE CATEGORY(2): NAME FOUNDATION SOIL TYPE	APPROXIMATE PORTION OF SITE	FOUNDATION TYPES: Footings	FOUNDATION TYPES: Piles	Grade Fill for Trafficability, Drainage or Structural Support	Removal of Poor Fills, Organics or Peat	Preload of Footing Floor Slab or Grade Fill Areas	Densification of Loose Soils to Prevent Liquefaction	Control of Methane Gas	EASE OF(3) DEVELOPMENT RATING Use Category: A	B	C	D
1	X		X	Fresser Sediments	100%	c,D	A,B,c	X	X	A,B,C	X		3	2-3	2	1
2	X		X	Fresser Sediments	90%	c,D	A,B,c	X	X	A,B,C	X		3	2-3	2	1
				Peat/Bog	10%	d	A,B,C,d	X	X	A,B,C	X	X	3	3	2	1-2
3	X		X	Fill/Refuse	60%	-	A,B,C,d	X	X	X		X	3	3	3	2
				Fresser Sediments	25%	c,D	A,B,c	X		X	X		3	2-3	2	1
				Peat/Bog	15%	d	A,B,C,d	X	X	X	X		3	3	2-3	1-2
4	X		X	Fresser Sediments	100%	c,D	A,B,c	X		A,B,C	X		3	2-3	2	1
5	X		X	Fresser Sediments	75%	c,D	A,B,c	X	X	A,B,C	X		3	2-3	2	1
				Peat/Bog	25%	d	A,B,C,d	X	X	X		X	3	3	2-3	1-2
6	X		X	Fresser Sediments	50%	c,D	A,B,c	X		A,B,C	X		3	2-3	2	1-2
				Peat/Bog	35%	d	A,B,C,d	X	X	X	X		3	3	2-3	1-2
				Fill	15%	x	x	x	X	x	x	x	3	3	2	1
7				Drift	75%	A,B,C,D							1	1	1	1
				Raised Beach	20%	A,B,C,D							1	1	1	1
				Refuse	5%	d	A,B,C,d	X	X	X		X	3	3	2-3	1-2
8	X		X	Fresser Sediments	60%	c,D	A,B,c	X	X	X	X		3	2-3	2	1
				Mineral Fill	40%	c,D	A,B,c	X	X	X	X		3	2-3	2	1
9	X		X	Fresser Sediments	50%	c,D	A,B,c	X		A,B,C	X		3	2-3	2	1
				Peat/Bog	50%	d	A,b,C,d	X	X	X	X		3	3	2-3	1
10	X	X	X	Peat/Bog	>95%	d	A,B,C,d	X	X	X	X		3	3	2-3	1
				Raised Beach or Glacio-Marine	<5%	A,B,C,D							2-3	2-3	1	1
11	X		X	Fresser Sediments	45%	c,D	A,B,c	X	X	A,B,C	X		3	2-3	2	1
				Peat/Bog	30%	d	A,B,C,d	X	X	X	X	X	3	3	2-3	1-2
				Fill/Refuse	15%	d	A,B,C,d	X	X	X	X	X	3	3	2-3	1-2
				Glacio-Fluvial	10%	a,b,c,D	a,b,c	X	X				1	1	1	1
12	X		X	Fresser Sediments	100%	c,D	A,B,c	X	X	A,B,C	X		3	3	2-3	1
13	X		X	Glacio-Marine	35%	c,D	a,b,c	X		a,b,c			3	2-3	2	1
				Raised Deltaic Beach	30%	b,c,D	a,b,c			a,b,c			2-3	2-3	1-2	1
				Peat/Bog	25%	d	a,b,C,d	X	X	X	X	X	3	3	2-3	1-2
				Fresser Sediments	5%	c,D	a,b,c			A,B,C	X		3	2-3	2	1
				Till	5%	A,B,C,D							1	1	1	1
14	X		X	Fresser Sediments	75%	c,D	A,B,c	X		A,B,C	X		3	2-3	2	1
				Glacio-Marine	15%	c,D	a,b,c	X		A,B,C			3	2-3	2	1
				Raised Deltaic	10%	c,D	a,b,c	X		a,b,c			2-3	2-3	1-2	1
15	X		X	Raised Beach/Deltaic	70%	b,c,D	a,b,c	X	X	a,b,c			2-3	2-3	1-2	1
				Fresser Sediments	10%	c,D	a,b,c	X	X	A,B,C	X		3	2-3	2	1
				Peat/Bog	20%	d	a,b,c,d	X	X	X		X	3	3	2-3	1-2
16	X		X	Fresser Sediments	100%	b,c,D	a,b,c	X	X	X	X		3	2-3	2	1
17	X		X	Outwash	45%	a,b,c,D	a,b,c			a,b,c			2	2	1-2	1
				Kames	30%	a,b,c,D	a,b,c				X		2	2	1-2	1
				Peat/Bog	25%	d	A,B,C,d	X	X	X		X	3	3	2-3	1-2
18	X		X	Fresser Sediments	80%	c,D	a,b,c	X	X	A,B,C	X		3	2-3	2	1
				Glacio-Fluvial	10%	A,B,C,D		X					1	1	1	1
				Peat/Bog	10%	d	A,B,C,d	X	X	X	X	X	3	3	2-3	1-2

NOTES:

1) Hazards rated only by occurrence within site rather than portion of site.

2) Treatments indicated by use categories A,B,C,D : lower case letters indicate uncertain use or uncertain use area, X indicates all uses (except use D for densification of liquefiable soils).

3) Ease of development rating: 1 = Conventional
2 = Moderate additional measures compared to rating 1
3 = Difficult development

Source: Golder Associates

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5.3 Floodplain Constraints

Dykes protect most industrial areas in the western part of the Lower Mainland. Protection in Upper Valley areas varies considerably, but virtually all of the designated industrial sites, especially in the regional district of Fraser-Cheam are within the floodplain of the Fraser River. Based on floodplain restrictions a brief assessment was carried out of the impact of the floodplain on the developability of industrial areas in central and eastern portions of the Lower Mainland.

5.3.1 River Flows and Stages

The Water Survey of Canada maintains water level gauging stations on the Fraser River at Hope and Mission. The period of records at Hope, dates back to 1912, whereas the Mission gauge has been in operation since 1965. The highest flood on record at Hope occurred in 1948 when a maximum daily discharge of 15,200 cubic metres per second was reached on May 31. Flood flows at Mission are approximately 15 percent greater than those at Hope. Using a flow-frequency analysis of the long term data at Hope and increasing these values by 15 percent gives the following flood stage and flow estimates for various return periods at Mission.

Fraser River at Mission - River Flows and Stages

Flow Event	River Flow (Cubic Metres Per Second)	River Stage (Metres)
Mean Annual	10,100	5.85
1:50 year flood	14,700	7.22
1:100 year flood	15,500	7.38
1:200 year flood	16,300	7.54
Dec. 1983 stage	-	1.55

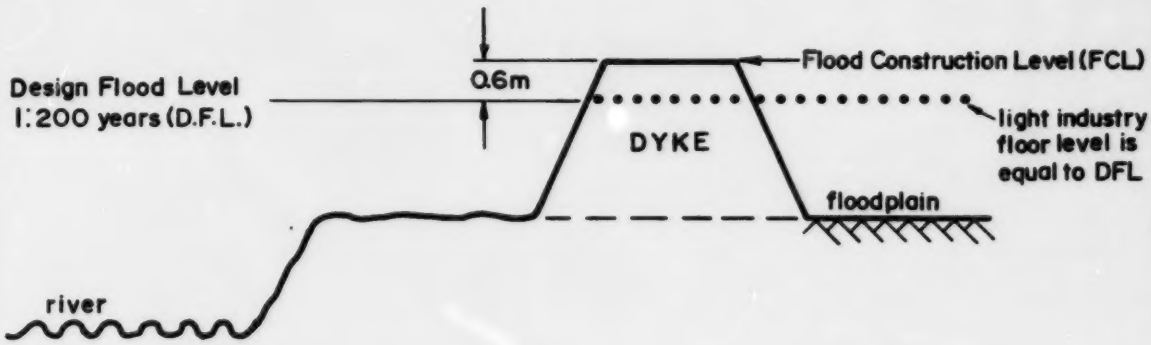
5.3.2 General Floodplain Considerations

The flat, low-lying alluvial plains of the Fraser River and its tributaries in the Lower Mainland area of the province are generally within the floodplain and therefore subject to periodic innundation. In general terms, the floodplain extends back from the watercourse to the point where the flat land meets a relatively steep slope. The floodplain limits have been mapped by the B.C. Ministry of Environment. In the eastern portion of the study area flooding results from high flows in the Fraser River and its tributaries. In the Fraser River Delta, high flood stages result from high river flows coincident with high tides, and wind set-up.

A certain degree of protection has been provided to land in many parts of the floodplain by the construction of dykes and other flood control works. The Design Flood Level (DFL) in the Lower Mainland is the 1:200 year flood level (see sketch). The Flood Construction Level (FCL) is the DFL plus 0.6 metres. Some of the existing dykes are designed to protect against the DFL; others, are not.

In formulating an industrial land development strategy, due consideration must be given to the susceptibility to flooding of the land in question. Construction of an expensive plant or other facility on a parcel of land that will be subject to flooding every few years is obviously not a wise investment decision.

Governmental jurisdictions in some areas of the Lower Mainland have bylaws that specify certain restrictions for construction within the floodplain. The following general criteria should be used to "floodproof" industrial installations located in the floodplain.



N O T E : Dykes built to 1:200 standard are at least equal to the Flood Construction Level (Design Flood Level + 0.6 meters). Heavy industry may build below the Flood Construction Level except for electrical switch gear.

FLOOD LEVEL SKETCH

Areas Protected by 1:200 Year Standard Dykes

Dykes meeting the 1:200 year standard of design have a crest elevation equal to, or greater than, the Flood Construction Level (FCL = DFL + 0.60 metres). Such dykes are built to uniform design and construction standards and are so designated as 1:200 year Standard Dykes by the B.C. Ministry of Environment.

Light industry located on lands protected by such dykes should have the underside of the floor system of buildings, and the base of any other facilities that could be damaged by flooding, fixed at an elevation no lower than the DFL.

Heavy industry (in this context referring to industry which would not suffer apppreciable flood damage as a result of water inundation) may locate on such lands with no special elevation requirements.

For both heavy and light industry, electrical switchgear should be located above the FCL.

Areas Outside 1:200 Year Standard Dykes

Heavy and light industry located outside the 1:200 year standard dykes should have the underside of floor systems and other facilities that could be damaged by flooding (including electrical switchgear), fixed at an elevation no lower than the FCL. There are also certain setback provisions from the natural boundaries of river, streams and other water bodies. For major rivers the setback requirements are generally in the 30 to 60 metre range.

Areas Protected by Dykes of Lesser Standard

Areas "protected" by dykes built to less than the 1:200 year standard are considered the same as if they were located outside the dyke and the FCL elevation applies.

5.3.3 Comments on Specific Industrial Areas

The following general comments on the various industrial areas are based on a brief field reconnaissance and a review of the floodplain map of the Dewdney-Alouette Regional District, which also covers part of Fraser-Cheam.

Chilliwack Industrial Areas

All areas are located in the floodplain and not protected by a 1:200 year standard dyke. Sites located just east of Sumas Mountain (known as Bowman's Mill) are three to four metres above the December 1983 water level in the Fraser River. The areas immediately east of Chilliwack Mountain (Village West) are two to three metres above the Fraser River water level. The 1:200 year flood level would be five to six metres higher than the Fraser River level in December, 1983.

Industrial development should thus be limited, unless fill is supplied to elevate the area to the Flood Construction Level.* The area east of Chilliwack Mountain, because of its distance from the river and low elevation, would be particularly expensive to develop, and thus should be left as a lower priority area or, alternatively, be replaced by a more suitable site. Both areas presently contain several industrial uses, a log sorting yard at Bowman's Mill, and several small service industrial enterprises at Village West. All are contained with the District of Chilliwack.

Mission Industrial Park

The area is in the floodplain and part of the land is protected by a dyke of less than 1:200 year standard. The dyke crest is four to five metres above the Fraser River and the natural

*The District of Chilliwack in cooperation with the Ministry of Environment is completing new floodplain siting regulations for inclusion in a new zoning bylaw.

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ground is one to two metres below the dyke crest. To facilitate industrial uses, either fill is required, or the dyke should be raised.

Albion Industrial Area

The area is located in the floodplain, between the railway tracks and the Fraser River. There is no dyke protection. The railway grade is about two metres above the natural ground. A dyke is difficult to construct here due to already existing industrial uses. As an alternative safety measure, fill will be required.

Maple Meadows Industrial Park

The area is in the floodplain and part is protected by a 1:200 year standard dyke. Land behind the dyke is about three metres lower than the dyke crest. The Fraser River is four to five metres below the dyke crest. Some landfilling behind the dyke is presently taking place. Fill will be required for light industry inside the dyke, no remedial measures are required for heavy industry.

West of Pitt Meadows Airport

All the land is located in the floodplain, between the 1:200 year dyke and the Fraser River. The dyke crest is four to five metres above the river level and the natural ground is about two metres lower. Some landfilling has taken place. Due to setback requirements and the limited extent of development permitted by the location of the river and dyke, relatively little opportunity exists for additional development.

5.3.4 Summary of Floodplain Constraints

While all of the areas examined have potential for industrial development, the Village West industrial area east of

Chilliwack Mountain is especially difficult and costly to develop when floodplain safety measures are taken into account. This area, under present standards, could be considered as very poor supply, and ideally should be replaced by a site with fewer and less costly floodplain constraints.

6.0 LOWER MAINLAND SUPPLY-DEMAND BALANCE

6.1 Analysis of Demand and Supply

Given the review of geotechnical and floodplain factors as they might impact the supply of industrial land, there appears to be no justification for deleting land from supply on the basis of development difficulty. Admittedly several sites throughout the Lower Mainland have potential for only a limited range of uses, and a number require expensive improvements if developed for other than storage and transportation uses. Several sites also require significant floodproofing protection. While these improvements may be costly, the land is developable if land values recognize the cost of improvements necessary to permit a wider range of uses. The constraints must be viewed in the context of residual land value. That is, if land values in proportion to other costs remain too high, then land will remain undeveloped or will be used for more intensive uses (e.g. commercial development) capable of absorbing the higher land values.

The developer in reviewing the price paid for land considers development costs such as site preparation, servicing, operational costs, etc. If these costs are high, then the residual amount which is left to purchase the land must be low to compensate for the higher building costs. Similarly where development costs are low, the residual amount for the land component can be higher. These market forces aid in determining the value of sites with physical limitations. While some site may be quite uneconomic to develop at present, this may well change over the years.

Demand figures have been accepted on the basis of already prepared projections. As discussed in Section 2.3 gross-up factors were not taken into account and can affect the supply/demand balance. For purposes of this project, demand

figures have all been recalculated to include a gross-up factor of 1.5 to account for infrastructure and replacement land needs. Some modification of gross-up factors may prove desirable through monitoring of data, should this prove desirable at a future date. Table VI-1 supplies demand figures which include the 1.5 gross-up factor. Data is given in five year intervals from 1986 to 2001.

Gross-ups were calculated only for total manufacturing and wholesale trade. No adjustments were made in other sectors, major transportation, other transportation, and utilities. Some gross-up could be applied to utility uses such as telephone and power stations, however they represent a very minor portion of overall industrial land consumption, and have minimal impact on gross demand projections. Since these sectors are already primarily composed of utility and transportation uses, little in the way of additional infrastructure requirements or replacement needs can reasonably be expected.

Supply data assumes the long term availability of both vacant lands and non-industrially used lands in industrial areas. If of course, the conversion of non-industrially used areas such as farm lands, residential properties and commercial sites does not occur, then the supply in the four regions could be reduced by as much as 2,000 hectares. This possibility is taken into account later in this section.

TABLE VI-1

LAND DEMAND INCLUDING GROSS-UP (hectares)

	1981-1986	1986-1991	1991-1996	1996-2001	CUMUL. TOTAL
GVRD					
Total Manufac.	71.6	298.7	721.2	220.4	
Wholesale Trade	51.0	161.4	277.5	301.7	
Major Transport.	37.2	37.7	38.0	38.5	
Other Transport.	38.1	39.6	42.1	43.7	
Utilities	12.5	12.6	12.9	13.0	
Total	210.4	550.0	1091.7	617.3	2469.4
CFVRD					
Total Manufac.	116.6	129.3	209.4	144.0	
Wholesale Trade	33.5	38.9	58.8	68.6	
Major Transport.	6.1	6.5	6.5	6.4	
Other Transport.	6.5	6.4	6.9	7.7	
Utilities	2.5	2.4	3.6	3.7	
Total	165.2	183.5	285.2	230.4	864.3
DARD					
Total Manufac.	39.5	49.8	85.7	56.4	
Whole Trade	0.6	1.8	2.4	3.6	
Major Transport.	0.0	0.0	0.0	0.0	
Other Transport.	0.4	0.5	0.7	0.4	
Utilities	0.0	0.4	0.0	0.4	
Total	40.5	52.5	88.8	60.8	242.6
FCRD					
Total Manufac.	15.8	20.7	43.7	22.5	
Wholesale Trade	1.8	4.2	7.4	7.8	
Major Transport.	2.0	2.0	2.0	2.1	
Other Transport.	7.7	8.1	8.5	8.9	
Utilities	2.8	3.2	4.1	5.2	
Total	30.1	38.2	65.7	46.5	180.5
LOWER MAINLAND					
Total Manufac.	257.4	498.5	1060.0	443.3	
Wholesale Trade	86.9	206.3	346.1	381.7	
Major Transport.	45.3	46.2	46.5	47.0	
Other Transport.	52.7	54.6	58.2	60.7	
Utilities	17.8	18.6	20.6	22.3	
Total	446.2	824.2	1531.4	955.0	3756.8

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TABLE VI-2

REVIEW OF SUPPLY-DEMAND BALANCE BY YEAR 2001 (in hectares)

Location	Supply Vacant	Supply Non-Ind	Supply Total	Gross Demand	Surplus	Surplus of Total Supply as % of Demand
Greater Vancouver	2635.0	1743.4	4378.4	2469.4	1909	77%
Cen. Fr. Valley	540.9	522.4	1063.3	864.3	199	23%
Dewdney-Alouette	317.3	231.9	549.2	242.6	307	126%
Fraser-Cheam R.D.	218.4	260.9	479.3	180.5	299	166%
LOWER MAINLAND	3711.6	2758.6	6470.2	3756.8	2714	72%

A review of this table indicates:

- that on the basis of total available supply, including industrial land now devoted to other uses, no long term supply shortage exists in any of the four lower mainland regional districts.

- that if only the vacant land supply is taken into account, a supply shortage is projected for Central Fraser Valley Regional District.

- that a surplus is available in Dewdney-Alouette Regional District, which in the long term could be enhanced by inclusion of 410 hectares now designated for aggregate resource use.

6.2 Need for Sufficient Market Surplus

It is inappropriate on the basis of the preceding data to assume that industrial land demand can be readily met from available supply. An equilibrium state between the demand and supply of industrial land is undesirable as it effectively

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reduces market flexibility, and assumes that a perfect match exists between the supply of land and demand for land. Since some industries have highly specialized locational requirements, and several industrial sites are available for only a limited range of development, it is important that all regions maintain a reasonable surplus. This is particularly important in the GVRD and Fraser-Cheam where geotechnical and floodplain constraints may make it desirable to examine alternate areas for industrial development. It is therefore appropriate to ensure a continued and reasonable surplus of supply over demand. No concensus exists as to what constitutes a desirable surplus. To provide for a sufficient margin of safety we propose that the surplus of raw land should be at least 30 to 50% over the demand for land. On this basis, Table VI-3 has been prepared to indicate the desired supply by the year 2001, assuming a 50% safety margin over demand.

TABLE VI-3

LOWER MAINLAND LAND SUPPLY (in hectares)

	Supply		Gross	Demand (x 1.5 To Allow	Surplus[1] Over	Surplus[2] Over Total	Market[3] Surplus Over Vacant	Market[4] Surplus Over Total
	Vacant Land	Total	Demand	For 50% Surplus)	Vacant	Supply	Supply	Supply
Greater Vancouver	2635.0	4378.4	2469.4	3704.1	165.6	1909	-1069	674
Central Fraser Valley	540.9	1063.3	864.3	1296.5	-323.4	199	- 756	-233
Dewdney-Alouette	317.3	549.2	242.6	363.9	74.7	307	- 47	185
Fraser-Cheam	218.4	479.3	180.5	270.8	37.9	299	- 52	209
LOWER MAINLAND	3711.6	6470.2	3756.8	5635.3	- 45.2	2714	-1924	835

Notes:

1. Surplus over vacant land calculated by subtracting gross demand from vacant supply
2. Surplus over total supply calculated by subtracting gross demand from total supply
3. Market surplus over vacant supply calculated by subtracting demand x 1.5 from vacant supply
4. Market surplus over total supply calculated by subtracting demand x 1.5 from total supply

It is incorrect to place too much emphasis on the apparent deficiency illustrated by the negative surplus which results from subtracting the demand x 1.5 figure from vacant supply. A considerable proportion (generally well over 50%) of the land supply devoted to non-industrial uses is comprised of farming and other low intensity uses. These lands could be readily converted to industrial use. In the Dewdney-Alouette region, supply data excludes relatively remote aggregate resource areas which are not as readily made available to industry. If this area of 410 hectares is included in the total supply, the ultimate overall surplus over total supply is increased from 185 hectares to 595 hectares.

6.3 Conclusions

The following conclusions are offered on the long term supply/demand balance in the lower mainland.

- In the Greater Vancouver Regional District an adequate supply of land is available for long term industrial development particularly if non-industrial uses are gradually converted to industry. A sufficient surplus exists to accommodate higher growth rates. Although all land in industrial designated areas is judged to be developable, it may still be desirable to examine alternatives if a detailed review of sites with limited potential reveals that areas with better foundation conditions are required to satisfy sectoral demand.

- Insufficient lands exist within the Central Fraser Valley Regional District to accommodate long term industrial demand. Only a relatively small real surplus will be available at the turn of the century which could seriously affect market conditions and which would be inadequate to accommodate higher than anticipated growth rates. To

provide a surplus of about 50%, at least an additional 250 hectares of land will be required.*

- By the turn of the century, a surplus of land will continue to be available in the Dewdney-Alouette Regional District. This surplus could be enhanced by the long term phasing in of areas designated for aggregate resource use. Careful monitoring of growth is necessary to ensure that the quality of available land is consistent with demand requirements.

- The Fraser-Cheam Regional District appears to have a very adequate surplus of land for industrial development. Several sites in the floodplain are, however, marginal in nature, and these results do not negate the need to examine alternative options as possible replacements for existing sites.

- In the Lower Mainland area no significant deficiencies in industrial land exist, especially in the short term. Over the long term, and particularly in the Central Fraser Valley Region, new lands may be required to accommodate growth, or to act as replacements for existing sites which have physical attributes which severely restrict the range of possible development.

*An earlier and separate review of CFVRD land supply, noted additional supply restrictions which suggest even greater long term land supply shortages in this region. (See Industrial Land Strategy, Central Fraser Valley Regional District, Underwood McLellan Ltd., January 1984).

7.0 INDUSTRIAL LAND STRATEGY

7.1 Introduction

The focus of the industrial project has been the development of a land strategy that can be implemented on a coordinated basis by the authorities having jurisdiction. This strategy must ensure the maintenance of a proper balance between the demand and supply of industrial land, and aim for realistic development controls designed to protect the public interest without regulating development unneccessarily.

The following sections provide strategy objectives and policy regulations, divided into separate components for purpose of clarity. These sections are:

A. Overall Planning Framework
B. Information and Data Base
C. Zoning and Land Use Regulations
D. Servicing Policy

For each section the strategy is comprised as follows:

Objective: Indicating the overall aim of the detailed action plans which comprise the strategy.

Action Plan: The specific measure which is recommended to ensure realization of the overall objective.

Impact: The anticipated effect of specific strategy action plans.

7.2 Strategy Discussion

As a preface to each of the strategy components, some of the principal concerns are discussed in this section.

7.2.1 Need For a Coordinated Industrial Land Planning Framework

Until late 1983, overall land use planning within the Lower Mainland was achieved through the mechanism of the Official Regional Plan jointly developed and adopted by the four Regional Districts. The Provincial Government has rescinded the authority of regional districts to adopt and enforce Official Regional Plans, and the former Plans no longer have any effect. The only remaining official plans are Official Community Plans or Official Settlement Plans. These require adoption by Municipal Councils or Regional Boards.

Through the process of preparing and administering these plans some important functions with relevance to coordinating industrial land use were available. These included data gathering, research, designation and protection of industrial lands, and information dissemination. During the course of this project it became apparent that many issues are to a large extent dependent on and influenced by access to such basic information. For example, Industrial land designations, supply evaluations, land banking, and zoning all depend on adequate information. The regional planning role supplied a means of providing this function, and an alternative is now required.

What Is Required

In evaluating the requirements with respect to a coordinated policy for industrial land use, these represent the principal needs:

1. A mechanism designed to ensure continued data collection and monitoring on a consistent and lower mainland wide basis.

2. A means to ensure that the collected information is analysed and publicized to all local government agencies, and is readily available to private sector organizations.

3. The establishment of a coordinating group capable of proposing to local government desirable actions to protect industrial land resources in view of identified trends or needs.

Methods Of Satisfying the Needs

Currently, two regional districts actively maintain a data base and are capable of disseminating the resultant information. Already for a number of years the Greater Vancouver Regional District has developed a comprehensive land use data base, and through a variety of publications makes this information available. Through a recent reorganization this service is now supplied to member municipal governments on a contract basis. Over the past year the Dewdney-Alouette Regional District has also developed a land use information system, and it too is designed for use by its component jurisdictions. Consideration to the development of a data base and information system has been given by Fraser-Cheam Regional District, but budget and staff considerations have prevented action. No planning staff is retained by Central Fraser Valley Regional District, and any work would require contracting out, or hiring of staff*.

In order that these services are provided consistently and throughout the lower mainland we believe two options exist:

1. To build on the already established resources available through both the GVRD and DARD, recognizing that these regions now have the staff and computer systems necessary to supply this service.

2. By requesting the Ministry of Industry and Small Business Development to coordinate the data base and dissemination function but retain the operative work at the local government level (i.e. data collection and analysis).

*It is understood that a planning technician will be on staff during 1984.

The first option suggests that a committee be struck, composed of staff of all four regions to ensure that a consistent approach is used. This option has the advantage of maintaining and supplying the data coordination service entirely at the local level, and reformulates committee structures that existed previously as a component of the regional plan preparation and monitoring system. The two regions which are limited in their capacity to carry out collection, monitoring, and analysis could consider developing their own resources, or alternatively can contract with DARD or GVRD to supply this service. It is also possible for some of the work to be contracted to private sector agencies.

The lower mainland industrial committee would also function as an advisory committee to municipalities, charged with the responsibility of recommending actions that could lead to Plan or bylaw amendments relative to industrial land use.

The second option is similar to the first, but uses the resources of MISBD to coordinate data collection, and would also see this agency responsible for publicizing information and recommendations as required. In view of the fact that two regions already have their own data collection and monitoring resources there is no real advantage in MISBD duplicating or taking over this role.

In either case, municipal staff, which now contributes substantial data and information to the respective regional districts would continue to do so.

7.2.2 Land Use Protection

As noted throughout this project, the nature of industrial development in the Lower Mainland is changing, with increased emphasis on the service sector. Land use regulations must be flexible and provide an environment which allows for the

process of re-allocation to continue. Some municipalities are addressing this issue either by establishing special zones, or by reviewing the range of permitted uses in existing zones. Equally important is the need to continue protecting the supply of industrial land by retaining the current Community Plan Industrial designations. Several recommendations in this regard are incorporated in the strategy.

In the more rural areas of the Lower Mainland the problem of land conversion exists - mainly the need to protect long term industrial areas from interim uses which make future industrial development prohibitive. Zoning and subdivision regulations currently imposed by local governments are sometimes only partly successful in protecting these areas. The problem is frequently one of uses permitted by local regulations, such as residences, which can be developed in sufficient numbers or at high enough prices to frustrate subsequent conversion to industry. In the long term the value of industry will govern whether the land is made available for industrial use. In the interim, changes in zoning regulations which avoid incompatible uses are important.

A further problem of land protection involves the difficulty of acquisition of potential industrial sites in areas characterized by numerous small parcels under multi-ownership. Here financial assistance, as proposed in the strategy, may be required to acquire key blocks of land to permit long term industrial development of the area.

7.2.3 The Supply of Industrial Land

A principal aim of the project involved the determination of the adequacy of supply.

While remaining industrial lands are not necessarily ideal, there is no major long term supply problem except in the Central Fraser Valley Regional District. In the short run, say ten years, all regional districts have an adequate supply. Short of suggesting that demand for the C.F.V.R.D. be channelled elsewhere, unrealistic in terms of market projections, additional lands will have to be found in this regional district.

Based on the geotechnical and floodplain evaluation some sites suffer from sufficient physical constraints to limit their use to a relatively narrow range of activities. A more detailed review is required to match demand with suitable supply, to ensure more than adequate supply exists for all identified forms of demand. This is not an urgent problem, but should be reviewed in the longer term once trends are monitored, and gross demand projections can be updated.

A. INDUSTRIAL LAND PLANNING FRAMEWORK

OBJECTIVE: To ensure a suitable planning framework designed to facilitate the retention of areas for long term industrial development.

ACTION PLAN	IMPACT
1. Establish a means of coordinating industrial land planning activities on a lower mainland basis by either -	
a) the establishment of a staff committee composed of representatives of all four lower mainland regional districts responsible for overseeing the coordination of region wide industrial land use planning related activities.	- addresses the need to maintain a consistent lower mainland wide coordinating mechanism for industrial land use planning activities
b) assigning through an appropriate provincial agency, such as the Ministry of Industry and Small Business Development a staff person charged with the responsibility of coordinating lower mainland industrial land planning activities, but retain at municipal and regional level all data and information collection functions.	- options are proposed for review by both local government agencies and by the province

A. INDUSTRIAL LAND PLANNING FRAMEWORK (cont'd)

ACTION PLAN	IMPACT
2. Areas identified as suitable for immediate and long term industrial development should be so designated in Official Community Plans and Official Settlement Plan	- encourages continued protection of identified industrial areas by way of Official Plans
3. Where industrial areas are designated in Official Plans, conceptual development plans should be prepared by local government with general detail as to:	- encourages preparation of planning guidelines to facilitate utility service planning and to assist private sector decision making
a) road location and r.o.w. width with particular attention to road continuity	- establishes conceptual detail only to permit sufficient flexibility to react to market changes
b) identification of those blocks of land reserved for quasi-industrial or commercial supporting services	
c) office development areas	
d) utility services	
Detailed land use classifications, and internal road layouts should be avoided or indicated only as guidelines.	

A. INDUSTRIAL LAND PLANNING FRAMEWORK (cont'd)

ACTION PLAN	IMPACT
4. By the turn of the century, sufficient additional industrial lands are required within Central Fraser Valley Regional District to ensure adequate supply and a healthy market. Future studies should recognize a need for a minimum of 250 hectares in addition to what is already designated or zoned. In Dewdney-Alouette Regional District, careful attention is required to the potential of aggregate resource areas as possible sites capable of meeting long term needs.	- will satisfy the need to identify and designate further long term industrial land within the C.F.V.R.D., and focusses on aggregate resource designated areas in D.A.R.D. to meet potential demand
5. If supported by monitoring of data and trends over the next five to ten years, an evaluation is proposed, especially within Fraser-Cheam and G.V.R.D., to ascertain whether lands with geotechnical and floodplain problems are satisfactory to meet demand.	- suggests further study of marginal industrial sites, if trends support justification of this

A. INDUSTRIAL LAND PLANNING FRAMEWORK (cont'd)

ACTION PLAN	IMPACT
6. In long term industrial areas predominated by existing small lots under multi-ownership, early land acquisition is recommended to facilitate future development and to minimize pressure for incompatible interim uses. It is proposed that a modest revolving fund be established by the province for acquisition purposes. Funds should be made available only where:	- assists local government in ensuring the long term viability of areas planned for industrial development - revolving fund allows reinvestment realized upon land sales in other industrial areas with similar land assembly problems
a) the land is designated for Industrial use by means of an Official Plan	
b) zoning regulations alone will not suffice to protect the land for industrial use	- establishes guidelines to assist in problem definition
c) smaller parcels (e.g. 0.5 hectares or less) predominate	
d) where each of the parcels in over 50% of the area is owned by different individuals	

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B. DATA BASE AND MONITORING

OBJECTIVE: To develop and maintain an adequate industrial development information and data base covering the entire Lower Mainland region.

ACTION PLAN	IMPACT
1. Establish at the earliest opportunity a committee composed of one staff member of each regional district and the Ministry of Industry and Small Business Development, charged with the responsibility of: a) defining what information and data pertaining to industrial land development is to be collected and maintained (e.g. land absorption rates, land conversion, industrial building occupancy, changes in zoning, availability of utilities, building types) b) determining what data is now collected by other agencies (e.g. Real Estate Boards, MISBD, Economic Development Commissions, planning departments, Statistics Canada, etc.) c) determining why the data is to be collected, how it is to be utilized, and the approximate cost of doing so.	- proposes a mechanism to explore the need, type, nature, and costs associated with the development of a common information and data base for the Lower Mainland. - comprehensively reviews all aspects of data collection, methodology, data management, and responsibility

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B. DATA BASE AND MONITORING (cont'd)

ACTION PLAN	IMPACT
d) examining the applicability of computerization of data and maps	- to facilitate future data management, review and interpretation
e) reviewing and recommending areas of responsibility for ongoing data collection including: - municipalities and regional districts - provincial agencies - private consultants - other agencies (a division of responsibility may well be most effective and desirable)	- proposes review of data collection considering both public and private sector approaches
Conclusions and recommendations to be submitted to each regional board, MISBD, and the Ministry of Municipal Affairs.	- proposes specific recommendations for implementation
In accord with Action Plan A-1, it is proposed that over the longer term data maintenance and dissemination be the responsibility of the regional staff coordinating Committee, or MISBD staff.	- ensures data is maintained by the coordinating agency responsible for activities pertaining to industrial land planning and development.
2. Ensure publication on an annual basis of all relevant data and information pertaining to industrial land use and trends throughout the Lower Mainland area.	- encourages the dissemination of collected data on industrial land use.

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B. DATA BASE AND MONITORING (cont'd)

ACTION PLAN	IMPACT
3. Survey on an occasional basis (e.g. every three years) industries and/or property owners in Industrial areas with respect to: a) current site or plant satisfaction b) potential development plans or wishes c) identified problems with respect to potential expansion or site development. Survey could be carried out by in-house staff or may be contracted out depending on time and cost.	- reviews the validity of current plans, procedures and bylaws as perceived by those most affected by the regulations - permits the modification of local strategies and procedures on the basis of identified needs and concerns.
4. To assist in defraying the cost of data collection and analysis it is proposed that the province broaden the scope of planning grants to local government, as a means of providing for this important function which benefits both the public and private sectors.	- would make data collection and analysis eligible for planning grant purposes
5. To ascertain future municipal and regional support for industrial land use data collection and analysis it is proposed that MISBD circulate a letter to local government soliciting input on this subject.	- defines level of local support for data collection and analysis

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C. ZONING AND LAND USE CONTROLS

OBJECTIVE: To establish guidelines designed to lead to the adoption of practical and market sensitive zoning and land use regulations for industrial areas.

ACTION PLAN	IMPACT
1. Review and revise, where appropriate, zoning regulations at both the municipal and regional district level with the view to:	
a) establishing a sufficient range of zones to ensure compatible development with respect to surrounding non-industrial areas	- provides for the establishment of a broader and more flexible range of land uses
b) providing for a reasonable range of industrial activity to be carried out within specified zones, by defining uses generically rather than by specific examples (see Item 2)	- avoids unnecessary rezonings including the attendant delays and costs
c) permitting some commercial/industrial development in areas of demand and in accord with other land use requirements	- takes into account recent market forces towards greater emphasis on service industrial and related activities
d) rescinding Comprehensive Development (CD) zones, and utilizing Development Permits as a means of controlling siting, appearance, landscaping, etc.	- removes some of the uncertainty associated with CD zones, but will still control the character of development, if desired, through the use of development permits.
2. The following principal zoning categories are proposed for Industrial uses:	- provides a guideline to local government on possible zoning classifications

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C. ZONING AND LAND USE CONTROLS (cont'd)

ACTION PLAN	IMPACT
a) extractive industries	
b) primary processing industries including exterior storage yards, terminal and dock facilities, transportation uses, ancillary facilities	
c) manufacture, processing, assembly and repair where the use is contained entirely within a building. Some minor retailing (for example restricted by a percentage of floor space or limited to products processed, manufactured or assembled on the premises)	
d) warehousing, distribution, offices, and retailing, where retailing is confined to merchandise in on-premise (or on-site) warehouses and where the principal building has a minimum gross floor area of 2,500 m^2.	- ensures that where retail type uses are permitted, that these are sufficiently large to be compatible with an industrial warehouse activity type of environment
3. Where industrially designated areas are supplied with adequate utility services, these areas should be prezoned to Industrial to expedite the development process.	- facilitates the development of industrial areas where utilities are adequate and available

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C. ZONING AND LAND USE CONTROLS (cont'd)

ACTION PLAN	IMPACT
4. In areas designated or reserved for long term Industrial use, zoning should limit interim uses as appropriate to agriculture, resource extraction, outdoor recreation uses or single family residential, with the lot size to be eight hectares or greater.	- aids to minimize inappropriate land conversions which erode the availability of areas for industrial uses.
5. In industrial designated and zoned areas composed primarily of smaller lots (e.g. one hectare or less), single family residences as principal uses should be prohibited.	- will assist to discourage difficult to convert interim uses which result in preventing long term industrial useage.
6. Have the coordinating committee review zoning bylaws and approval procedures to recommend methods designed to reduce complexity and provide standardization where appropriate.	- establishes a coordinated methodology to assess the approval process and land use bylaws
7. Where desirable, local government should be requested to use the replotting provisions of the Municipal Act to ensure the optimum use of industrial land.	- proposes replotting provisions where appropriate

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D. SERVICING POLICY

OBJECTIVE: To ensure the provision throughout the Lower Mainland of an adequate supply of serviced land, within the economic means of industry and local government.

ACTION PLAN	IMPACT
1. On basis of short term demand projections, using as a guide data gathered through monitoring, establish a firm municipal or regional district policy of annual utility trunk line extensions to accommodate industrial development.	- provides for a meaningful written policy affecting the timing of trunk line services to industrial areas (policies could be incorporated in Official Plans).
2. In those areas of the Lower Mainland where the cost of extending services is beyond the financial means of local government, the cooperation of the B.C. Development Corporation or the utilization of the new Industrial infrastructure element of the Industrial and Regional Development Program should be sought and encouraged as a means of assisting in feasibility studies and service installations.	- encourages the examination of alternate methods to explore the availability of funding of services in areas of demand with limited local financial resources
3. In the development of servicing plans, ongoing liaison should be maintained with utility companies, railways, and harbour commissions in the planning and development of servicing infrastructure.	- encourages coordinated development planning of industrial areas

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D. SERVICING POLICY (cont'd)

ACTION PLAN	IMPACT
4. Review municipal development cost charges and methods of apportioning costs in consideration of new revenue sharing formula, and in recognition of the need to maintain an equitable balance of costs between industrial and other forms of development.	- ensures that older bylaws and policies are reviewed in relation to new trends and cost sharing formula.
5. Where development cost charges are imposed, it is proposed that payment of these charges be required upon application of a building permit, rather than at subdivision or equivalent stages.	- minimizes the impact on cash flow for developers of new industrial sites.

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